KHYBER MEDICAL UNIVERSITY

NEUROPHYSIOLOGY TECHNOLOGY CURRICULUM

STUDY GUIDE SEMESTER 5

16 Weeks Activity Planner

2024-25

CENTRAL CURRICULUM & ASSESSMENT COMMITTE FOR NURSING, REHABILITATION SCIENCES & ALLIED HEALTH SCIENCES

Contents

Team for TOS Development

1.	Mr. ABDUL REHMAN	Director KMU-IPMS Peshawar
2.	Mr. ZAR JAMIL KHAN	Subject Specialist KMU-IPMS Peshawar
3.	Mr. AWAL MIR	Coordinator Neurophysiology KMU-IPMS Peshawar

Team for TOS Review

1.	Mr. MUHAMMAD ASIF ZAIB	Lecturer KMU-IPMS Peshawar
2.	Mr. BABAR ALI	Lecturer KMU-IPMS Peshawar

Vision & Mission

Khyber Medical University (KMU) Vision:

Khyber Medical University will be the global leader in health sciences academics and research for efficient and compassionate health care.

Khyber Medical University (KMU) Mission:

Khyber Medical University aims to promote professional competence through learning and innovation for providing comprehensive quality health care to the nation.

Institute of Paramedical Sciences Peshawar (IPMS-PESH) Mission:

To produce allied health professionals who excel in their skills, research, compassionate care, and community involvement, thereby enhancing the healthcare system

Program Introduction

The BS Neurophysiology program at Khyber Medical University is a comprehensive four-year undergraduate degree designed to equip students with the knowledge, skills, and competencies required to become competent neurophysiology technologists. Neurophysiology is a vital healthcare profession that focuses on the diagnosis, treatment, and management of nervous system disorders, muscular system disorders, and diseases. Neurophysiology technologists work closely with patients, healthcare providers, and other medical professionals to provide accurate diagnoses and improve patient outcomes.

This Program is structured to provide students with a strong foundation in the sciences and specialized training in neurophysiology technology. Students will learn about the principles of nervous & muscular systems, pathophysiology, neuropharmacology, and the latest techniques and technologies used in clinical neurophysiology. Throughout the four-year program, students will participate in clinical rotations and internships at top-tier hospitals and healthcare facilities, where they will gain hands-on experience in patient care and develop the skills necessary to work effectively in a fast-paced healthcare environment. Upon completion of the program, graduates will be eligible to take the American Board of Registration of Electroencephalographic and Evoked Potential Technologist (ABRET) certification exam and will be qualified to work as registered electroencephalographic & evoked potential technologist (R. EEGT. and R.EPT.).

Objectives

By the end of the BS Neurophysiology Degree, the students will be able to:

Cognitive Domain

1. Explain the principles of nervous & muscular system physiology, pathophysiology, and neuropharmacology.
2. Interpret pertinent clinical information to select appropriate diagnostic procedures for neonatal, pediatric, and adult patients.
3. Identify potential expanded roles for clinical neurophysiology professionals by examining professional behavior and the history of the field.
4. Discuss the current professional and clinical roles in clinical neurophysiology.
5. Apply knowledge of the field to address current or future needs related to clinical practice, administration, education, and/or research

Psychomotor Domain

1. Demonstrate proficiency in using the latest techniques and technologies in neurophysiology technology.
2. Perform patient assessments and deliver high-quality diagnoses in a clinical setting.
3. Effectively communicate with patients, healthcare providers, and other medical professionals using appropriate terminology.
4. Work collaboratively with inter-professional teams to deliver effective, patient-centered diagnosis & care.
5. Develop the skills necessary to work efficiently in a fast-paced healthcare environment.

Affective Domain

1. Exhibit professional behavior and adhere to ethical values in the delivery of clinical neurophysiology.
2. Incorporate an evidence-based approach to patient care by identifying and accessing appropriate literature and assessing relevant medical research.
3. Demonstrate leadership skills in the neurophysiology profession, healthcare, and the community.
4. Engage in continuous learning and professional development to stay current with the latest advancements in the field of neurophysiology.
5. Provide compassionate and patient-centered care that respects the dignity and autonomy of each individual

Fifth Semester Subjects for BS Neurophysiology Technology

S. No	Subjects	Duration
1	NEUR-623 Central Nervous System Credit Hours 3 (2+1)	16 weeks
2	NEUR-624 Peripheral Nervous System Credit Hours 3 (2+1)	16 weeks
3	NEUR-625 Autonomic Nervous System Credit Hours 3 (2+1)	16 weeks
4	NEUR-626 Skeletal Muscular System Credit Hours 3 (2+1)	16 weeks
5	NEUR-627 Electroencephalography Credit Hours 3 (2+1)	16 weeks
6	NEUR-628 Sleep Technology Credit Hours 3 (2+1)	16 weeks

NEUR-623 Central Nervous System 3(2+1)

Course Description

This course will introduce the students to basic concepts of the central nervous system, structures, pathology, and functions-related terms used in clinical neurophysiology & its importance. Students will be able to understand how to interpret this terminology for upper motor neuron & lower motor neuron pathology. This course will cover the different parts of the central nervous system like the cerebral cortex, cerebellum, deep structure of the brain, CSF, spinal cord, brainstem & its relation to other system involvement. It also covers different clinical conditions faced in daily routine electrophysiological evaluation. It will help in developing the practical skill of students by determining the differential & final diagnosis during neurophysiological procedures like NCS, EMG, RNS, EPs, PSG, & EEG.

Learning Objectives

Cognitive Domain

By the end of this course, students should be able to

1. Describe the upper motor neuron & lower motor neuron & its pathology
2. Discuss the excitable nervous tissue and action potential
3. Explain the surface of the brain, cerebral cortex & cerebral hemisphere
4. Describe the brainstem, deep structure of the brain & cerebellum
5. Demonstrate the reflex action & the synapse

Psychomotor Domain

By the end of this course, students should be able to

1. Perform the procedure of recording the above physiology of CNS
2. Make difference between upper motor neurons & lower motor neurons and their neurophysiological recording
3. Perform clinical examination to know about any pathology related to central nervous tissue or grey matter & white matter
4. Perform the recording of cerebral cortex activity (EEG) & spinal cord recording (SSEP) independently
5. Perform all electrophysiological investigations independently
6. Perform clinical & differential diagnosis independently

Affective Domain

By the end of this course, students should be able to

1. Demonstrate punctuality
2. Follow the specified norms of the IL, SGD teaching & learning effectively
3. Demonstrate humbleness and use socially acceptable language during academic and social interactions with human models, colleagues, and teachers.
4. Demonstrate ethically competent decisions when confronted with an ethical, social, or moral problem in professional or personal life
5. Comply with SOPs of practical & procedure effectively.

.

TABLE OF SPECIFICATIONS

TOS-CENTRAL NERVOUS SYSTEM 3(2+1)

S. No	Weeks	Contents	Learning Outcome	Domain C	Domain P	Domain A	MIT's	Time/ Hours	Assessment	No of Items
TOPIC: EXCITABLE NERVOUS TISSUE										
1	Week-1	Introduction	Introduction to neuron and nervous tissue	C 1			Interactive Lecture/SGD	2	MCQs	03
2		Physiology/function	Explain the glial cell and their function.	C 2						
3		Structure of nervous tissue	Describe the chemical nature of myelin, and summarize the difference in ways in which unmyelinated and myelinated neurons conduct impulses	C 3						
4		Practical performance	Observe the structure of excitable nervous tissue with the help of color charts, models & videos		P 4		Demo	1	OSPE	01
5		Ethical norms	Adopt how to take care of patient ethical norms			A 4	Role Play			
TOPIC: SURFACE OF THE BRAIN										
6	Week-2	Introduction	Introduction to the different fissure & sulci of the brain	C 1			Interactive Lecture/SGD	2	MCQs	05
7		Introduction of choroid plexus	Describe the choroid plexus in CNS	C 3						
8		Functions of corpus callosum	Explain the corpus callosum & its physiology	C 2						
9		Practical performance	Observe the structure of different fissure, sulci in the brain with the help of color charts and models		P 4		Demo	1	OSPE	01
10		SOPs compliance	Adopt how to take care of charts and models			A 4	Role Play			
TOPIC: CEREBRAL HEMISPHERE										
11	Week-3	Introduction	Describe briefly the cerebral hemisphere	C 1			Interactive Lecture/SGD	2	MCQs	03
12		Parts of the cerebral cortex	Discuss different parts of the cerebral hemisphere	C 2						
13		Functions of the cerebral cortex	Explain the different functions of the cerebral hemisphere	C 2						
14		Difference between right & left hemisphere	Discuss the difference between the right & left hemisphere	C 3						
15		Practical performance	Observe the structure of right & left cerebral hemisphere with the help of color charts & models		P 4		Demo	1	OSPE	01
16		Ethical norms	Adopt how to take care of patient ethical norms			A 4	Role Play			

TOPIC: CEREBELLUM										
17	Week-4	Introduction	Introduction to the cerebellum	C 1			Interactive Lecture/SGD	2	MCQs /SEQs	03
18		Location of cerebellum	Explain the location of the cerebellum	C 2						
19		Diseases of cerebellum	Discuss different diseases affecting the cerebellum	C 3						
20		Practical performance	Observe different parts cerebellum with the help of color charts and models		P 4		Demo	1	OSPE	01
21		Values	Adopt the values of affective domain such as, integrity, respect, and advocacy			A 4	Role Play			
TOPIC: BRAIN STEM & DEEP STRUCTURE OF THE BRAIN										
22	Week-5	Introduction	Introduction to the brain stem	C 1			Interactive Lecture/SGD	2	MCQs /SEQs	05
23		Structure	Explain the structure of the brain stem & its parts	C 2						
24		Physiology of thalamus	Explain the thalamus and its physiology	C 3						
25		Functions of hypothalamus	Explain the hypothalamus and its physiology	C 3						
26		Practical performance	Observe the structures of the brain stem with the help of color charts & models		P 4		Demo	1	OSPE	01
27		Attitude	Adopt how to think about something, such as patient interest, appreciation, and enthusiasm			A 4	Role Play			
TOPIC: GRAY MATTER AND WHITE MATTER OF CNS										
28	Week-6	Introduction	Introduction to gray and white matter of the CNS	C 1			Interactive Lecture/SGD	2	MCQs /SEQs	02
29		Physiology of lobes	Explain the physiology of grey and white matter	C 2						
31		Physiology & pathophysiology of grey and white matter	Explain the physiology of gray and white matter & its pathophysiology	C 3						
32		Practical performance	Observe the structure of gray & white matter with the help of color charts & models		P 4		Demo	1	OSPE	-
33		Emotions	Adopt the feeling of emotions, such as empathy, motivation, & confidence during procedure			A 4	Role Play			
TOPIC: PHYSIOLOGY OF NEURON										
34	Week-7	Introduction	Introduction to the physiology of the neuron	C 1			Interactive Lecture/SGD	2	MCQs /SEQs	03
35		Types of neuron	Explain the different types of neurons according to anatomy & physiology	C 2						

36		Resting potential	Explain the resting potential	C 3						
37		Impulse of neuron	Explain the moving impulse in neuron	C 4						
38		Ion conduction	Explain the membrane voltage and ion conduction.	C 5						
39		Practical performance	Observe the structure of neuron & resting potential with the help of color charts & models		P 4		Demo	1	OSPE	-
40		SOPs compliance	Adopt how to take care of charts and models			A 4	Role Play			
TOPIC: ACTION POTENTIAL										
41	Week-8	Introduction	Introduction to action potential (AP)	C 1			Interactive Lecture/SGD	2	MCQs /SEQs	06
42		Phases of AP	Explain the different phases of AP	C 2						
43		Nature of nerve impulse	Explain the nature of neuron impulse.	C 3						
44		Practical performance	Observe different phases of AP structure during NCS recording		P 4		Demo	1	OSPE	01
45		Values	Adopt the values of affective domain such as, integrity, respect, and advocacy			A 4	Role Play			
TOPIC: CEREBRAL CORTEX AND MIDBRAIN										
46	Week-9	Introduction	Introduction to the cerebral cortex	C 1			Interactive Lecture/SGD	2	MCQs /SEQs	04
47		Explain the structure of the mid-brain	Explain the basic structure of the mid-brain & its location	C 2						
48		Functions of the mid-brain	Explain the functions of the mid-brain	C 3						
49		Cerebral aqueduct	Explain the cerebral aqueduct of the midbrain	C 3						
50		Practical performance	Observe the structure & location of the midbrain with the help of color charts & models		P 4		Demo	1	OSPE	01
51		Ethical norms	Adopt how to take care of patient ethical norms			A 4	Role Play			
TOPIC: BASAL GANGLIA										
52	Week-10	Introduction	Introduction to the basal ganglia	C 1			Interactive Lecture/SGD	2	MCQs /SEQs	06
53		Physiology	Explain the physiology of basal ganglia	C 2						
54		Functions of red nucleus	Explain the functions of the red nucleus	C 1						

55		Pathology of basal ganglia	Explain the diseases of basal ganglia							
56		Practical performance	Observe the structure & location of basal ganglia with the help of color charts & models		P 4		Demo	1	OSPE	01
57		Attitude	Adopt how to think about something, such as patient interest, appreciation, and enthusiasm			A 4	Role Play			
TOPIC: LIMBIC SYSTEM										
58	Week-11	Introduction	Introduction to the limbic system	C 1			Interactive Lecture/SGD	2	MCQs /SEQs	04
59		Papez circuit	Explain the Papez circuit	C 2						
60		Function of the limbic system	Explain the physiology of the limbic system	C 1						
61		Pathology of limbic system	Explain the diseases of the limbic system	C 2						
62		Practical performance	Observe structure of various parts of the limbic system with the help of color charts & models		P 4		Demo	1	OSPE	01
63		SOPs compliance	Adopt how to take care of charts and models			A 4	Role Play			
TOPIC: SPINAL CORD										
64	Week-12	Introduction	Explain the length and extent of the spinal cord	C 1			Interactive Lecture/SGD	2	MCQs /SEQs	04
65		Ascending tract	Explain the ascending tract of the spinal cord	C 2						
66		Descending tract	Explain the descending tract of the spinal cord	C 1						
67		Diseases of the spinal cord	Explain the Syringomyelia, dissociated sensory loss, syringobulbia, tabs dorsalis diseases of SC	C 2						
68		Practical performance	Observe the structure of the spinal cord with the help of color charts & models		P 4		Demo	1	OSPE	01
69		Values	Adopt the values of affective domain such as, integrity, respect, and advocacy			A 4	Role Play			
TOPIC: REFLEX ACTION										
70	Week-13	Introduction	Explain reflex action and reflex arch	C 1			Interactive Lecture/SGD	2	MCQs /SEQs	06
71		Types	Explain the types of reflex action according to its structure	C 1						
72		reflex arch	Explain the stretch reflex	C 2						

73		Withdrawal reflex	Explain the withdrawal reflex	C 3						
74		Classification of reflex	Explain the classification of reflexes	C 4						
75		Practical performance	Observe the structure of reflex action with the help of color charts & models		P 4		Demo	1	OSPE	01
76		Emotions	Adopt the feeling of emotions, such as empathy, motivation, & confidence during procedure			A 4	Role Play			
TOPIC: UPPER AND LOWER MOTOR NEURON										
77	Week-14	Introduction	Introduction to the upper and lower motor neuron	C 1			Interactive Lecture/SGD	2	MCQs /SEQs	06
78		Difference between UMN & LMN	Explain the difference between upper and lower motor neuron	C 2						
79		Bell's Magendie Law	Explain the Bell's Magendie law	C 3						
80		Renshaw cell & its physiology	Explain Renshaw cells and their physiology	C 4						
81		The Hemi section of section	Explain the effects of the Hemi section of the spinal cord	C 4						
82		Practical performance	Observe the structure of UMN & LMN with the help of color charts & models		P 4		Demo	1	OSPE	01
83		Attitude	Adopt how to think about something, such as patient interest, appreciation, and enthusiasm			A 4	Role Play			
TOPIC: CEREBRO SPINAL FLUID										
84	Week-15	Introduction	Introduction to the CSF (Cerebro Spinal Fluid)	C 1			Interactive Lecture /SGD	2	MCQs /SEQs	05
85		Characteristics of CSF	Explain the characteristics of CSF	C 2						
86		Composition of CSF	Explain the composition of CSF	C 3						
87		Circulation of CSF	Explain the circulation of CSF	C 3						
88		Blockage of CSF	Illustrate the hydrocephalus and its causes	C 4						
8		Practical performance	Observe the flow of CSF in the brain with the help of color charts & models		P 4		Demo	1	OSPE	01

9										
90		SOPs compliance	Adopt how to take care of charts and models			A4	Role Play			
TOPIC: THE SYNAPSE										
91	Week-16	Introduction	Introduction to the chemical synapse	C1			Interactive Lecture/SGD	2	MCQs /SEQs	05
92		Structure & function of synapse	Explain the physiology and anatomy of synapse	C2						
93		Types of basic communication	Explain the types and basis of chemical communication	C3						
94		Factors that increased or decreased transmission	Explain the factors that increase or decrease synaptic transmission	C3						
95		Practical performance	Observe the structure of synapses with the help of color charts & models		P4		Demo	1	OSPE	01
96		Ethical norms	Adopt how to take care of patient ethical norms			A4	Role Play			

RECOMMENDED BOOKS; **NAME OF BOOK** **AUTHORS**

1	**Snell's Clinical Neuroanatomy**	Richard S. Snell
2	**Anatomy and Physiology for Nurses**	PR Ashalatha and G Deepa
3	**Medical Physiology**	Kim E. Barrett and Susan M. Barman

ASSESSMENT BREAKDOWN

S. No	TOPICS	No of MCQs	No of OSPE/OSCE STATIONS	STATIC/INTERACTIVE
1	EXCITABLE NERVOUS TISSUE	03	01	Static
2	SURFACE OF THE BRAIN	05	01	Static
3	CEREBRAL HEMISPHERE	03	01	Static
4	CEREBELLUM	03	01	Static
5	BRAIN STEM & DEEP STRUCTURE OF THE BRAIN	05	01	Static
6	GRAY MATTER AND WHITE MATTER OF CNS	02	-	-
7	PHYSIOLOGY OF NEURON	03	-	-
8	ACTION POTENTIAL	06	01	Static
9	CEREBRAL CORTEX AND MIDBRAIN	04	01	Static
10	BASAL GANGLIA	06	01	Static
11	LIMBIC SYSTEM	04	01	Interactive

12	SPINAL CORD	04	01	Static
13	REFLEX ACTION	06	01	Static
14	UPPER AND LOWER MOTOR NEURON	06	01	Static
15	CEREBRO SPINAL FLUID	05	01	Static
16	THE SYNAPSE	05	01	Static
	TOTAL	**70**	**14**	

NEUR-624 Peripheral Nervous System 3(2+1)

Course Description

This course will introduce students to the fundamental concepts of the peripheral nervous system, including its structures, pathology, and the terminology used in clinical neurophysiology. Students will learn how to interpret these terms about peripheral nervous system pathology and neuropathy. The course will cover the twelve pairs of cranial nerves and thirty-one pairs of spinal nerves, along with various nerve plexuses, their branches, nerve anomalies, and associated pathologies. Additionally, it will address common clinical conditions encountered in routine electrophysiological evaluations. By the end of the course, students will develop practical skills necessary for making differential and final diagnoses during neurophysiological procedures such as nerve conduction studies (NCS), electromyography (EMG), repetitive nerve stimulation (RNS), evoked potentials (EPs), polysomnography (PSG), and electroencephalography (EEG).

Learning Objectives

Cognitive Domain

By the end of this course, students should be able to

1. Describe the different cranial nerves and its pathology
2. Discuss brachial plexuses, their structure, pathology, clinical findings, and their electrophysiological recording
3. Explain cervical plexuses, lumbosacral plexus, and its branches & its different pathology
4. Describe the optic pathway and hearing pathway in brief
5. Demonstrate MGA & other peripheral nerve anomalies in the human body

Psychomotor Domain

By the end of this course, students should be able to

1. Perform the procedure of recording the above abnormalities in PNS
2. Demonstrate the difference between upper motor neuron lesion & lower motor neuron lesion (mononeuropathy/polyneuropathy)
3. Perform clinical examination to know about any pathology related to PNS
4. Perform the recording of peripheral nerves, both motor & sensory nerves recording independently
5. Perform all electrophysiological investigations independently
6. Perform clinical & differential diagnosis independently.

Affective Domain

By the end of this course, students should be able to

1. Demonstrate punctuality
2. Follow the specified norms of the IL, SGD teaching & learning effectively
3. Demonstrate humbleness and use socially acceptable language during academic and social interactions with human models, colleagues, and teachers.
4. Demonstrate ethically competent decisions when confronted with an ethical, social, or moral problem in professional or personal life
5- Comply with SOPs of practical & procedure effectively

TABLE OF SPECIFICATIONS

TOS-PERIPHERAL NERVOSU SYSTEM 3(2+1)

S. No	Weeks	Contents	Learning Outcome	Domain C	Domain P	Domain A	MIT's	Time/Hours	Assessment	No of Items
TOPIC: INTRODUCTION TO PNS										
1	Week -1	Introduction	Introduction to the Peripheral Nervous System	C 1			Interactive Lecture/SGD	2	MCQs	-
2		Physiology of PNS	Explain the physiology of PNS	C 2						
3		Relationship of PNS & CNS	Explain the relationship of PNS & CNS	C 2						
4		Practical performance	Observe the structure of PNS with the help of color charts, models & videos		P 4		Demo	1	OSPE	-
5		Emotions	Adopt the feeling of emotions, such as empathy, motivation, & confidence during procedure			A 4	Role Play			
TOPIC: THE CRANIAL NERVES										
6	Week -2	Introduction	Introduction to the first, second, third & fourth cranial nerves	C 1			Interactive Lecture/SGD	2	MCQs	04
7		Physiology	Describe the function of these cranial nerves	C 3						
8		Applied anatomy	Explain the applied anatomy of these cranial nerves	C 2						
9		Practical performance	Observe the structure of these cranial nerves with the help of color charts and models		P 4		Demo	1	OSPE	01
10		Ethical norms	Adopt how to take care of patient ethical norms			A 4	Role Play			
TOPIC: THE CRANIAL NERVES										
11	Week -3	Introduction	Describe briefly the fifth, sixth, seventh & eighth cranial nerves	C 1			Interactive Lecture/SGD	2	MCQs	04
12		Branches of CNs	Discuss different branches of these nerves	C 2						
13		Function of CNs	Explain the physiology of these cranial nerves	C 2						
14		Applied anatomy	Discuss the applied anatomy of these four cranial nerves	C 3						
15		Practical performance	Observe the structure of cranial nerves with the help of color charts & models		P 4		Demo	1	OSPE	01

16		Ethical norms	Adopt how to take care of patient ethical norms			A 4	Role Play			
TOPIC: THE BULBAR NERVES										
17	Week -4	Introduction	Introduction to the night, tenth, eleventh & twelfth cranial nerves	C 1			Interactive Lecture/SGD	2	MCQs/ SEQs	04
18		Physiology	Explain the origin point & physiology of these cranial nerves	C 2						
19		Applied anatomy	Discuss the applied anatomy of these bulbar nerves	C 3						
20		Practical performance	Observe these bulbar nerves structure with the help of color charts & models		P 4		Demo	1	OSPE	01
21		Emotions	Adopt the feeling of emotions, such as empathy, motivation, & confidence during procedure			A 4	Role Play			
TOPIC: THE OPTIC PATHWAY										
22	Week -5	Introduction	Introduction to the Optic Pathway	C 1			Interactive Lecture/SGD	2	MCQs/ SEQs	04
23		Structure	Explain the structure of the optic pathway	C 2						
24		Physiology	Explain the function of the optic pathway	C 3						
25		Applied anatomy	Explain the applied anatomy of optic pathway	C 3						
26		Practical performance	Observe the structures of the optic pathway with the help of color charts & models		P 4		Demo	1	OSPE	01
27		SOPs compliance	Adopt how to take care of charts and models			A 4	Role Play			
TOPIC: HEARING PATHWAY										
28	Week -6	Introduction	Introduction to the Hearing Pathway and eighth cranial nerve	C 1			Interactive Lecture/SGD	2	MCQs/ SEQs	04
29		Structure of hearing pathway	Explain the structure of the hearing pathway	C 2						
30		Physiology	Explain the physiology of the hearing pathway	C 3						
31		Applied anatomy	Explain the applied anatomy of the hearing pathway	C 4						
32		Practical performance	Observe the hearing pathway structure from PNS to CNS with the help of color charts & models		P 4		Demo	1	OSPE	01
33		Values	Adopt the values of affective domain such as, integrity, respect, and advocacy			A 4	Role Play			
TOPIC: NERVE PLEXUSES										
34	Week	Introduction	Introduction to the nerve plexuses	C			Interactive	2	MCQs/	05

	-7			1			Lecture/SGD		SEQs	
35		Structure of plexuses	Explain the structure of nerve plexuses	C 2						
36		Function or physiology	Explain the functions of nerve plexuses	C 3						
37		Cervical plexuses (Introduction)	Explain cervical plexuses in detail	C 4						
38		Physiology and Applied Anatomy	Explain the physiology & applied anatomy of cervical plexuses	C 5						
39		Practical performance	Observe the structure of different plexuses with the help of color charts & models		P 4		Demo	1	OSPE	01
40		Attitude	Adopt how to think about something, such as patient interest, appreciation, and enthusiasm			A 4	Role Play			
TOPIC: THE BRACHIAL PLEXUSES										
41	Week -8	Introduction	Introduction to the brachial plexuses	C 1			Interactive Lecture/SGD	2	MCQs/ SEQs	05
42		Physiology	Explain the function of brachial plexuses	C 2						
43		Applied anatomy	Explain the applied anatomy of brachial plexuses	C 3						
44		Practical performance	Observe the structure & location of the brachial plexuses with the help of color charts & models		P 4		Demo	1	OSPE	01
45		Emotions	Adopt the feeling of emotions, such as empathy, motivation, & confidence during procedure			A 4	Role Play			
TOPIC: THE LUMBAR PLEXUSES										
46	Week -9	Introduction	Introduction to the lumbar plexuses	C 1			Interactive Lecture/SGD	2	MCQs/ SEQs	05
47		Structure & location	Explain the structure & location of lumbar plexuses	C 2						
48		Function of lumbar plexuses	Explain the importance & functions of lumbar plexuses	C 3						
49		Applied anatomy	Explain the applied anatomy of lumbar plexuses	C 3						
50		Practical performance	Observe the structure & location of the lumbar plexuses with the help of color charts & models		P 4		Demo	1	OSPE	01
51		Ethical norms	Adopt how to take care of patient ethical norms			A 4	Role Play			
TOPIC: ERB'S PALSY AND KLUMPKE'S PALSY										
52	Week -10	Introduction	Introduction to the Erb's palsy and Klumpke's palsy	C 1			Interactive Lecture/SGD	2	MCQs/ SEQs	05
53		Causes	Explain the causes of these two palsies	C						

				2						
54		Signs & symptoms	Explain the signs & symptoms of these palsies	C 3						
55		Differential diagnosis	Explain the clinical presentation of these palsies & differential diagnosis							
56		Practical performance	Demonstrate the interpretation and clinical presentation of these two palsies during NCS procedure		P 4		Demo	1	OSPE	01
57		SOPs compliance	Adopt how to take care of charts and models			A 4	Role Play			
TOPIC: SATURDAY NIGHT PALSY										
58	Week -11	Introduction	Introduction to the Saturday night palsy	C 1			Interactive Lecture/SGD	2	MCQs/ SEQs	05
59		Signs & symptoms	Explain the signs and symptoms of radial nerve palsy	C 2						
60		Causes	Explain the causes of Saturday night palsy	C 2						
61		Differential diagnosis	Explain the differential diagnosis of radial nerve palsy	C 3						
62		Practical performance	Demonstrate the interpretation and clinical presentation of Saturday night palsy during NCS study		P 4		Demo	1	OSPE	01
63		Values	Adopt the values of affective domain such as, integrity, respect, and advocacy			A 4	Role Play			
TOPIC: THE SACRAL PLEXUSES										
64	Week -12	Introduction	Explain the sacral plexuses	C 1			Interactive Lecture/SGD	2	MCQs/ SEQs	05
65		Originating nerves	Explain the different nerves originating from the sacral plexuses	C 2						
66		Function	Explain the function of sacral plexuses	C 2						
67		Applied anatomy	Explain the applied anatomy of sacral plexuses	C 3						
68		Practical performance	Observe the structure of sacral plexuses with the help of color charts & models		P 4		Demo	1	OSPE	-
69		Attitude	Adopt how to think about something, such as patient interest, appreciation, and enthusiasm			A 4	Role Play			
TOPIC: SENSORY NERVES OF UPPER LIMBS										
70	Week -13	Introduction	Explain the sensory nerves of the upper limbs	C 1			Interactive Lecture/SGD	2	MCQs/ SEQs	05
71		Physiology	Explain the physiology of these sensory nerves	C 1						
72		Clinical presentation	Explain the clinical presentation of these sensory nerves and the	C						

			area of distribution	2						
73		Structure	Explain the structures of these nerves	C 3						
74		Electrophysiological recording	Explain the electrophysiological recording of these nerves	C 4						
75		Practical performance	Observe the structure of upper limbs' sensory nerves with the help of color charts & models		P 4		Demo	1	OSPE	01
76		SOPs compliance	Adopt how to take care of charts and models			A 4	Role Play			
TOPIC: SENSORY NERVES OF LOWER LIMBS										
77	Week -14	Introduction	Introduction to the lower limbs sensory nerves	C 1			Interactive Lecture/SGD	2	MCQs/ SEQs	05
78		Importance of lower limbs sensory nerves	Explain the importance of lower limbs sensory nerves	C 2						
79		Physiology	Explain the physiology of lower limbs sensory nerves	C 3						
80		Clinical presentation	Explain the clinical presentation associated with lower limbs sensory nerves	C 4						
81		Electrophysiological recording	Explain the electrophysiological recording of these nerves	C 4						
82		Practical performance	Examine the structure of lower limbs sensory nerves with the help of sensory nerve conduction study		P 4		Demo	1	OSPE	01
83		Values	Adopt the values of affective domain such as, integrity, respect, and advocacy			A 4	Role Play			
TOPIC: THE MARTIN GRUBER ANASTOMOSIS										
84	Week -15	Introduction	Introduction to MGA	C 1			Interactive Lecture/SGD	2	MCQs/ SEQs	05
85		Structure of MGA	Explain the structure of MGA	C 2						
86		Functions of MGA	Explain the function of MGA	C 3						
87		Clinical presentation	Explain the clinical presentation of MGA patients	C 3						
88		Electrophysiological recording	Illustrate the electrophysiological evidence of MGA patients	C 4						
89		Practical performance	Demonstrate the interpretation of MGA in NCS study		P 4		Demo	1	OSPE	01
90		Emotions	Adopt the feeling of emotions, such as empathy, motivation, & confidence during procedure			A 4	Role Play			
TOPIC: THE PERIPHERAL NERVOUS SYSTEM ANOMALIES										
91	Week	Introduction	Introduction PNS anomalies	C			Interactive	2	MCQs/	05

	-16			1			Lecture/SGD		SEQs	
92		Classification	Explain the different types of nerve anomalies	C 2						
93		Clinical presentation	Explain the clinical presentation of different anomalies	C 3						
94		Electrophysiological recording	Explain the electrophysiological recording of these anomalies	C 3						
95		Practical performance	Observe the structure of different types of nerve anomalies with the help of color charts & models		P 4		Demo	1	OSPE	01
96		Ethical norms	Adopt how to take care of patient ethical norms			A 4	Role Play			

RECOMMENDED BOOKS; **NAME OF BOOK** **AUTHORS**

1	**Snell's Clinical Neuroanatomy**	Richard S. Snell
2	**Anatomy and Physiology for Nurses**	PR Ashalatha and G Deepa
3	**Medical Physiology**	Kim E. Barrett and Susan M. Barman

ASSESSMENT BREAKDOWN

S. No	TOPICS	No of MCQs	No of OSPE/OSCE STATIONS	STATIC/INTERACTIVE
1	INTRODUCTION TO PNS	-	-	-
2	THE CRANIAL NERVES 1, 2, 3, 4	04	01	Static
3	THE CRANIAL NERVES 5, 6, 7, 8	04	01	Static
4	THE BULBAR NERVES 9. 10, 11, 12	04	01	Static
5	THE OPTIC PATHWAY	04	01	Static
6	HEARING PATHWAY	04	01	Static
7	NERVE PLEXUSES	05	01	Static
8	THE BRACHIAL PLEXUSES	05	01	Static
9	THE LUMBAR PLEXUSES	05	01	Static
10	ERB'S PALSY AND KLUMPKE'S PALSY	05	01	Static
11	SATURDAY NIGHT PALSY	05	01	Interactive
12	THE SACRAL PLEXUSES	05	-	-
13	SENSORY NERVES OF UPPER LIMBS	05	01	Static
14	SENSORY NERVES OF LOWER LIMBS	05	01	Static
15	THE MARTIN GRUBER ANASTOMOSIS	05	01	Static
16	THE PERIPHERAL NERVOUS SYSTEM ANOMALIES	05	01	Static
	TOTAL	**70**	**14**	

NEUR-625 Autonomic Nervous System 3(2+1)

Course Description

This course will introduce students to the basic concepts of the autonomic nervous system, including its structures, pathologies, and functions. It will cover terms used in clinical neurophysiology and emphasize their importance. Students will learn how the sympathetic and parasympathetic nervous systems function. The course will also address various types of neurotransmitters and neuromodulators that work together to perform movements. Additionally, it will cover different clinical conditions encountered during routine electrophysiological evaluations. The course aims to develop students' practical skills by helping them determine differential and final diagnoses during neurophysiological procedures such as nerve conduction studies (NCS), electromyography (EMG), repetitive nerve stimulation (RNS), evoked potentials (EPs), sympathetic skin response (SSR), heart rate variability (HRDB), and electroencephalography (EEG).

Learning Objectives

Cognitive Domain

By the end of this course, students should be able to

1. Describe the sympathetic and parasympathetic nerves and its physiology
2. Discuss the regulatory system of ANS
3. Explain neurotransmitters and its types & difference between NTs & NMs
4. Describe the pain pathway and its physiology
5. Demonstrate ANS examination and procedures

Psychomotor Domain

By the end of this course, students should be able to

1. Perform the procedure of recording the above abnormalities in ANS
2. Evaluate the difference between sympathetic & parasympathetic nerves
3. Perform clinical examination to know about any pathology related to ANS
4. Perform the recording of ANS independently
5. Perform all electrophysiological investigations independently

6. Perform clinical & differential diagnosis independently

Affective Domain

By the end of this course, students should be able to

1. Demonstrate punctuality
2. Follow the specified norms of the IL, SGD teaching & learning effectively
3. Demonstrate humbleness and use socially acceptable language during academic and social interactions with human models, colleagues, and teachers.
4. Demonstrate ethically competent decisions when confronted with an ethical, social, or moral problem in professional or personal life
5. Comply with SOPs of practical & procedure effectively

TABLE OF SPECIFICATIONS

TOS-AUTONOMIC NERVOUS SYSTEM 3(2+1)

S. No	Weeks	Contents	Learning Outcome	Domain C	Domain P	Domain A	MIT's	Time/ Hours	Assessment	No of Items
TOPIC: INTRODUCTION TO ANS										
1	Week-1	Introduction	Explain Autonomic Nervous System	C 1			Interactive Lecture/SGD	2	MCQs	03
2		Structure of ANS	Explain the structure and function of the autonomic nervous system	C 2						
3		Parts of ANS	Explain different parts of the autonomic nervous system	C 2						
4		Practical performance	Examine the structure of ANS with the help of color charts & models		P 4		Demo	1	OSPE	-
5		SOPs compliance	Adopt how to take care of charts and models			A 4	Role Play			
TOPIC: NEUROTRANSMITTER										
6	Week-2	Introduction	Explain neurotransmitter & its criteria that define a neurotransmitter.	C 1			Interactive Lecture/SGD	2	MCQs	05
7		Receptors of NTs	Describe the receptor of the ANS neurotransmitter	C 3						
8		Types of ANS ganglia	Explain autonomic ganglia & its types	C 3						
9		Practical performance	Observe the structure of neurotransmitters and their receptors with the help of color charts & models		P 4		Demo	1	OSPE	01
10		Emotions	Adopt the feeling of emotions, such as empathy, motivation, & confidence during procedure			A 4	Role Play			
TOPIC: REGULATORY SYSTEM OF ANS										
11	Week-3	Introduction	Describe the regulatory system of the ANS.	C 1			Interactive Lecture/SGD	2	MCQs	03
12		Function of hypothalamus	Discuss autonomic functions of the hypothalamus	C 2						
13		Transmission of ANS	Explain chemical transmission in ANS.	C 2						
14		Categories of NTs	Discuss different categories of neurotransmitters.	C 3						
15		Practical performance	Observe the structure of autonomic ganglia & chemical transmission in ANS with the help of color charts & models		P 4		Demo	1	OSPE	-
16		Ethical norms	Adopt how to take care of patient ethical norms			A 4	Role Play			

TOPIC: CHOLINERGIC, ADRENERGIC, AND ANTI ADRENERGIC DRUGS										
17	Week-4	Introduction	Define the synthesis of epinephrine and norepinephrine.	C 1			Interactive Lecture/SGD	2	MCQs/ SEQs	05
18		Degradation	Explain the fate degradation of epinephrine and norepinephrine.	C 2						
19		Drug transmission	Discuss cholinergic and adrenergic drug transmission in ANS.	C 3						
20		Practical performance	Examine the structure of cholinergic, adrenergic, and antiadrenergic transmission of drugs in ANS with the help of color charts and models		P 4		Demo	1	OSPE	01
21		Attitude	Adopt how to think about something, such as patient interest, appreciation, and enthusiasm			A 4	Role Play			
TOPIC: EXCITATORY AND INHIBITORY NTs										
22	Week-5	Introduction	Define glutamate and its receptor.	C 1			Interactive Lecture/SGD	2	MCQs/ SEQs	05
23		GABA & Glycine structure	Describe GABA and glycine	C 2						
24		Application of neuropharmacology	Discuss neuropharmacology and its application.	C 3						
25		Excitatory and Inhibitory NTs	Explain excitatory and inhibitory neurotransmitters	C 3						
26		Practical performance	Examine structure of different types of neurotransmitters with the help of color charts & models		P 4		Demo	1	OSPE	01
27		Ethical norms	Adopt how to take care of patient ethical norms			A 4	Role Play			
TOPIC: TYPES OF NTs										
28	Week-6	Introduction	Define fast acting NTs and slow acting NTs	C 1			Interactive Lecture/SGD	2	MCQs/ SEQs	05
29		Classification	Classify psychoactive drugs and its effects on BRAIN?	C 2						
30		Clinical symptoms	Describe addiction & the drugs which effects human brain?	C 3						
31		Dopamine & endorphin secretion	Discuss dopamine & endorphin secretion?	C 4						
32		Practical performance	Observe structure of different types of neurotransmitters with the help of color charts & models		P 4		Demo	1	OSPE	01
33		Values	Adopt the values of affective domain such as, integrity, respect, and advocacy			A 4	Role Play			
TOPIC: SYNAPTIC TRANSMISSION										
34	Week-7	Introduction	Define synaptic transmission	C 1			Interactive Lecture/SGD	2	MCQs/ SEQs	03
35		Types	Describe steps of synaptic transmission?	C						

				2						
36		Storage & release of NTs	Discuss storage and release of NTs?	C 3						
37		Receptor types	Describe receptor types and selectivity?	C 4						
38		PNS NTs	Discuss PNS NTs and its receptors?	C 5						
39		Practical performance	Observe structure of different types of neurotransmitters work in PNS with the help of color charts & models		P 4		Demo	1	OSPE	01
40		Emotions	Adopt the feeling of emotions, such as empathy, motivation, & confidence during procedure			A 4	Role Play			
TOPIC: SUBTYPES OF NTs										
41	Week-8	Introduction	Define subtypes of peripheral receptors?	C 1			Interactive Lecture/SGD	2	MCQs/ SEQs	03
42		Physiology	Describe the physiology of subtypes NTs in PNS	C 2						
43		Cycles of NTs	Discuss life cycle of epinephrine, norepinephrine and acetylcholine?	C 3						
44		Practical performance	Examine life cycle of different types of neurotransmitters work in PNS with the help of color charts & models		P 4		Demo	1	OSPE	01
45		SOPs compliance	Adopt how to take care of charts and models			A 4	Role Play			
TOPIC: CLASSIFICATION OF NEUROTRANSMITTERS										
46	Week-9	Classes of NTs	Define different classes of NTs according to their structure.	C 1			Interactive Lecture/SGD	2	MCQs/ SEQs	05
47		Neuroactive peptide	Explain Neuroactive peptide.	C 2						
48		Pharmacology of Glutamate	Describe the pharmacology of glutamate.	C 3						
49		Clinical application of Ach	Describe acetylcholine and its clinical implications	C 3						
50		Practical performance	Observe structure of different classes of neurotransmitters with the help of color charts & models		P 4		Demo	1	OSPE	01
51		Attitude	Adopt how to think about something, such as patient interest, appreciation, and enthusiasm			A 4	Role Play			
TOPIC: CLASSIFICATION OF NEUROTRANSMITTERS										
52	Week-10	Introduction to neurotransmitters	Define serotonin and its clinical implication	C 1			Interactive Lecture/SGD	2	MCQs/ SEQs	05
53		Clinical application of epinephrine	Discuss epinephrine and its clinical implications	C 2						
54		Clinical application of	Define norepinephrine and its clinical implication	C						

		norepinephrine		1						
55		NTs receptors	Discuss serotonin, epinephrine, and norepinephrine receptors.	C 2						
56		Practical performance	Examine structure of different classes of neurotransmitters with the help of color charts & models		P 4		Demo	1	OSPE	01
57		Values	Adopt the values of affective domain such as, integrity, respect, and advocacy			A 4	Role Play			
TOPIC: PROPERTIES OF NEUROTRANSMITTERS										
58	Week-11	Introduction	Define different properties of NTs	C 1			Interactive Lecture/SGD	2	MCQs/ SEQs	05
59		Mode of action	Discuss the mode of action of different NTs.	C 2						
60		Associated disorders	Define diseases associated with NTs	C 1						
61		Recent developments in NTs	Discuss recent developments in NTs.	C 2						
62		Practical performance	Examine function of different properties of neurotransmitters with the help of color charts & models		P 4		Demo	1	OSPE	01
63		Emotions	Adopt the feeling of emotions, such as empathy, motivation, & confidence during procedure			A 4	Role Play			
TOPIC: NEUROMODULATORS										
64	Week-12	Introduction	Define neuromodulator	C 1			Interactive Lecture/SGD	2	MCQs/ SEQs	03
65		Difference b/w NM & NT	Discuss the main difference between NTs & NMs	C 2						
66		Introduction of lipids	Define neuromodulatory lipids.	C 1						
67		CNS NT & NM	Discuss CNS NTs & NMs	C 2						
68		Practical performance	Observe structure of different neurotransmitters & neuromodulators with the help of color charts & models		P 4		Demo	1	OSPE	01
69		SOPs compliance	Adopt how to take care of charts and models			A 4	Role Play			
TOPIC: TYPES OF NEUROMODULATORS										
70	Week-13	Introduction	Define different types of neuromodulators	C 1			Interactive Lecture/SGD	2	MCQs/ SEQs	05
71		Physiology	Describe the physiology of different neuromodulators?	C 1						
72		Sites of secretion	Discuss different sites of secretion of NMs	C 2						
73		Synaptic transmission	Describe cell signaling and synaptic transmission in NMs and NTs	C						

				3						
74		ADD introduction	Discuss the disease ADD (attention deficit disorder) associated with NT	C 4						
75		Practical performance	Observe structure of different sites of secretion of neurotransmitters & neuromodulators with the help of color charts & models		P 4		Demo	1	OSPE	01
76		Attitude	Adopt how to think about something, such as patient interest, appreciation, and enthusiasm			A 4	Role Play			
TOPIC: PHYSIOLOGY OF PAIN										
77	Week-14	Introduction	Define physiology of PAIN	C 1			Interactive Lecture/SGD	2	MCQs/ SEQs	05
78		Classification of pain	Describe classification of pain?	C 2						
79		Hyperalgesia & allodynia	Discuss hyperalgesia and allodynia?	C 3						
80		Introduction to sensory coding	Explain sensory coding?	C 4						
81		Intensity of pain	Explain intensity of PAIN?	C 4						
82		Practical performance	Examine structure of different types of PAIN with the help of color charts & models		P 4		Demo	1	OSPE	01
83		Ethical norms	Adopt how to take care of patient ethical norms			A 4	Role Play			
TOPIC: PAIN PATHWAY										
84	Week-15	Introduction	Define central pain pathway.	C 1			Interactive Lecture/SGD	2	MCQs/ SEQs	05
85		Components of pain	Explain the components of PAIN.	C 2						
86		Spinal trigeminal tract	Describe the spinal trigeminal tract.	C 3						
87		Recording of sensation	Discuss electrophysiological recording of sensation.	C 3						
88		Sensory loss	Illustrate dissociated sensory loss.	C 4						
89		Practical performance	Examine structure of different types of PAIN pathways with the help of color charts & models		P 4		Demo	1	OSPE	01
90		Ethical norms	Adopt how to take care of patient ethical norms			A 4	Role Play			
TOPIC: AUTONOMIC NERVOUS SYSTEM EXAMINATION/PROCEDURE										
91	Week-16	Introduction	Define autonomic nervous system recording in brief and its dysfunction.	C 1			Interactive Lecture/SGD	2	MCQs/ SEQs	05
92		Autonomic	Describe different diseases of PNS & CNS causing autonomic dysfunction.	C						

		dysfunction		2							
93		Introduction of HRDB & Valsalva ratio	Discuss deep breathing heart rate (HRDB) and Valsalva ratio.	C 3							
94		Interpretation of SSR & QSART	Describe sympathetic skin response (SSR) and quantitative sudomotor axon reflex test (QSART)	C 3							
95		Practical performance	Perform the procedure of SSR, HRBD & Valsalva ratio independently		P 4		Demo	1	OSPE	01	
96		SOPs compliance	Comply to SOPs for the procedure of SSR, HRDB, Valsalva ratio, and patient preparation and examination			A 4	Role Play				

RECOMMENDED BOOKS; **NAME OF BOOK** **AUTHORS**

1	**Snell's Clinical Neuroanatomy**	Richard S. Snell
2	**Anatomy and Physiology for Nurses**	PR Ashalatha and G Deepa
3	**Medical Physiology**	Kim E. Barrett and Susan M. Barman

ASSESSMENT BREAKDOWN

S. No	TOPICS	No of MCQs	No of OSPE/OSCE STATIONS	STATIC/INTERACTIVE
1	INTRODUCTION TO ANS	03	-	Static
2	NEUROTRANSMITTER	05	01	Static
3	REGULATORY SYSTEM OF ANS	03	-	-
4	CHOLINERGIC, ADRENERGIC, AND ANTI ADRENERGIC DRUGS	05	01	Static
5	EXCITATORY AND INHIBITORY NTs	05	01	Static
6	TYPES OF NTs	05	01	Static
7	SYNAPTIC TRANSMISSION	03	01	Static
8	SUBTYPES OF NTs	03	01	Static
9	CLASSIFICATION OF NEUROTRANSMITTERS	05	01	Static
10	CLASSIFICATION OF NEUROTRANSMITTERS	05	01	Static
11	PROPERTIES OF NEUROTRANSMITTERS	05	01	Interactive
12	NEUROMODULATORS	03	01	Static
13	TYPES OF NEUROMODULATORS	05	01	Static
14	PHYSIOLOGY OF PAIN	05	01	Static
15	PAIN PATHWAY	05	01	Static
16	AUTONOMIC NERVOUS SYSTEM EXAMINATION/PROCEDURE	05	01	Static
	TOTAL	**70**	**14**	

NEUR-626 Skeletal Muscular System 3(2+1)

Course Description

This course will introduce the students to basic concepts of the skeletal muscular system, structures, pathology, and functions-related terms used in clinical neurophysiology and their importance. Students will be able to understand how to interpret this terminology for skeletal muscular system pathology. This course will cover the different types of muscle groups, which work together to act/motion. It also covers different clinical conditions faced in daily routine electrophysiological evaluation. It will help in developing the practical skill of students by determining the differential & final diagnosis during the neurophysiological procedures like NCS, EMG, RNS, EPs, & EEG.

Learning Objectives

Cognitive Domain

By the end of this course, students should be able to

1. Describe muscle fiber & common terms associated with the muscle fiber
2. Discuss the comparison between smooth, cardiac, and skeletal muscle
3. Explain the classification of muscle according to the anatomical region of the human body
4. Describe the flexors and extensors group of muscle
5. Demonstrate muscle of upper and lower limbs

Psychomotor Domain

By the end of this course, students should be able to

1. Perform the procedure of recording MUAP (motor unit action potential) from a muscle
2. Demonstrate the difference between upper and lower limb muscles
3. Perform clinical examination to know about any pathology related to muscle tissue
4. Perform the recording of electromyography (EMG) independently
5. Perform all electrophysiological investigations independently
6. Perform clinical & differential diagnosis independently

Affective Domain

By the end of this course, students should be able to

1-Demonstrate punctuality

2. Follow the specified norms of the IL, SGD teaching & learning effectively
3. Demonstrate humbleness and use socially acceptable language during academic and social interactions with human models, colleagues, and teachers.
4. Demonstrate ethically competent decisions when confronted with an ethical, social, or moral problem in professional or personal life
5. Comply with SOPs of practical & procedure effectively

TABLE OF SPECIFICATIONS

TOS-SKELETAL MUSCULAR SYSTEM 3(2+1)

S. No	Weeks	Contents	Learning Outcome	Domain C	Domain P	Domain A	MIT's	Time/ Hours	Assessment	No of Items
TOPIC: INTRODUCTION TO MUSCULAR SYSTEM										
1	Week-1	Introduction	Introduction to the skeletal muscular system	C 1			Interactive Lecture/SGD	2	MCQs	03
2		Gross anatomy of muscle tissue	Explain the gross anatomy of skeletal muscle	C 2						
3		Classification	Explain the classification of muscles according to structure	C 2						
4		Practical performance	Observe the structure of the skeletal muscular system with the help of color charts, models & videos		P 4		Demo	1	OSPE	01
5		Ethical norms	Adopt how to take care of patient ethical norms			A 4	Role Play			
TOPIC: MUSCLE FIBER										
6	Week-2	Introduction	Introduction to the basic unit of muscle	C 1			Interactive Lecture/SGD	2	MCQs	05
7		Innervation of skeletal muscle	Describe the innervation of skeletal muscles	C 3						
8		Motor unit, NMJ and Endplate (Introduction)	Explain the motor unit, motor end plate, and NMJ	C 2						
9		Practical performance	Examine the structure of muscle fiber & NMJ with the help of color charts and models		P 4		Demo	1	OSPE	01
10		SOPs compliance	Adopt how to take care of charts and models			A 4	Role Play			
TOPIC: COMMON TERMS ASSOCIATED WITH MUSCLE										
11	Week-3	Introduction	Describe briefly common terms associated with skeletal muscles	C 1			Interactive Lecture/SGD	2	MCQs	03
12		Attachment of muscle	Discuss attachment of skeletal muscles with tendon	C 2						
13		Atrophy & hypertrophy	Explain the difference between atrophy and hypertrophy of skeletal muscles	C 2						
14		Agonist & antagonist muscles	Discuss the difference between agonists' and antagonists' muscles	C 3						

15		Practical performance	Examine the structure of agonist and antagonist muscles with the help of charts & models		P 4		Demo	1	OSPE	01
16		Emotions	Adopt the feeling of emotions, such as empathy, motivation, & confidence during procedure			A 4	Role Play			
TOPIC: COMPARISON BETWEEN SKELETAL, SMOOTH AND CARDIAC MUSCLES										
17	Week-4	Introduction	Introduction to the cardiac & smooth muscles	C 1			Interactive Lecture/SGD	2	MCQs/ SEQs	05
18		Characteristics of cardiac muscle	Explain the characteristics of cardiac muscles	C 2						
19		Characteristics of smooth muscle	Discuss the characteristics of smooth muscles	C 3						
20		Practical performance	Examine the structure of smooth and cardiac muscles with the help of color charts and models		P 4		Demo	1	OSPE	01
21		Ethical norms	Adopt how to take care of patient ethical norms			A 4	Role Play			
TOPIC: CLASSIFICATION OF MUSCLES										
22	Week-5	Introduction	Introduction to classification of muscles according to body regions	C 1			Interactive Lecture/SGD	2	MCQs/ SEQs	05
23		Muscle of HEAD region	Explain the muscles of the HEAD region	C 2						
24		Muscle of NECK	Explain the anterolateral muscles of the NECK	C 3						
25		Muscle of TRUNK	Explain the muscles of the TRUNK	C 3						
26		Practical performance	Observe the structures of head, neck, and trunk muscles with the help of color charts & models		P 4		Demo	1	OSPE	01
27		Values	Adopt the values of affective domain such as, integrity, respect, and advocacy			A 4	Role Play			
TOPIC: MUSCLE OF MASTICATION										
28	Week-6	Introduction	Introduction to the muscle of mastication	C 1			Interactive Lecture/SGD	2	MCQs/ SEQs	03
29		Physiology	Explain the function/physiology of muscle of mastication	C 2						
30		The masseter muscle	Explain the muscle masseter	C 3						
31		Function	Explain the function of lateral pterygoid & medial pterygoid muscle	C 4						
32		Practical performance	Examine the structure of muscle of mastication with the help of color charts & models		P 4		Demo	1	OSPE	01
33		Attitude	Adopt how to think about something, such as patient interest, appreciation, and enthusiasm			A 4	Role Play			

TOPIC: THE MUSCLE OF TRUNK										
34	Week-7	Introduction	Introduction to the muscle of the trunk	C 1			Interactive Lecture/SGD	2	MCQs/ SEQs	03
35		Deep muscle of the back	Explain the deep muscle of the BACK	C 2						
36		Muscle of THORACIC & ABDOMEN	Explain the muscles of the thoracic and abdomen	C 3						
37		Muscle of PELVIS	Explain the muscle of the pelvis	C 4						
38		Muscle of PERINEUM	Explain the muscle of the perineum	C 5						
39		Practical performance	Examine the structure of muscle of the trunk with the help of color charts & models		P 4		Demo	1	OSPE	01
40		Values	Adopt the values of affective domain such as, integrity, respect, and advocacy			A 4	Role Play			
TOPIC: MUSCLE OF THE SHOULDER GIRDLE										
41	Week-8	Introduction	Introduction to the muscle of the scapula	C 1			Interactive Lecture/SGD	2	MCQs/ SEQs	05
42		Muscle of CHEST WALL	Explain the muscle of the chest wall	C 2						
43		Physiology	Explain the various functions of these muscles	C 3						
44		Practical performance	Examine the structure & location of the shoulder muscle with the help of color charts & models		P 4		Demo	1	OSPE	01
45		Emotions	Adopt the feeling of emotions, such as empathy, motivation, & confidence during procedure			A 4	Role Play			
TOPIC: MUSCLE OF THE ARM (FLEXORS)										
46	Week-9	Introduction	Introduction to the muscle of the arm (anterior compartment)	C 1			Interactive Lecture/SGD	2	MCQs/ SEQs	05
47		Physiology of anterior compartment	Explain the basic physiology of the anterior compartment arm muscle	C 2						
48		Pathophysiology	Explain the pathophysiology of the anterior compartment of arm muscles	C 3						
49		Origin and insertion point	Explain the origin and insertion point of these muscles	C 3						
50		Practical performance	Examine the structure & location of the anterior compartment of arm muscles with the help of color charts & models		P 4		Demo	1	OSPE	01
51		SOPs compliance	Adopt how to take care of charts and models			A 4	Role Play			
TOPIC: MUSCLES OF ARM (EXTENSORS)										
52	Wee	Introduction	Introduction to the muscles of ARM (posterior compartment)	C			Interactive	2	MCQs/	05

	k-10			1			Lecture/SGD		SEQs	
53		Physiology of posterior compartment	Explain the function/action of posterior compartment arm muscles	C 2						
54		Nerve supply	Explain the nerve supply of the posterior compartment arm muscle	C 1						
55		Pathology	Explain the pathology of the posterior compartment arm muscle							
56		Practical performance	Examine the structure of muscle of the arm posterior compartment with the help of color charts & models		P 4		Demo	1	OSPE	01
57		Attitude	Adopt how to think about something, such as patient interest, appreciation, and enthusiasm			A 4	Role Play			
TOPIC: MUSCLE OF THE FOREARM										
58	Wee k-11	Introduction	Introduction to the muscle of the forearm	C 1			Interactive Lecture/SGD	2	MCQs/ SEQs	05
59		Flexor of forearm	Explain the flexors group of the forearm	C 2						
60		The function of the flexor of the forearm	Explain the functions of the anterior compartment/flexors of the forearm	C 1						
61		Nerve innervation	Explain the nerve innervation to these muscles	C 2						
62		Practical performance	Examine structure of flexor muscle of the forearm with the help of color charts & models		P 4		Demo	1	OSPE	01
63		Ethical norms	Adopt how to take care of patient ethical norms			A 4	Role Play			
TOPIC:DEEP MUSCLE OF FOREARM										
64	Wee k-12	Introduction	Explain the deep muscle of forearm	C 1			Interactive Lecture/SGD	2	MCQs/ SEQs	03
65		Physiology	Explain the physiology of deep muscle of forearm	C 2						
66		Nerve innervation	Explain the nerve root innervation of these muscles	C 1						
67		Pathology	Explain the different pathology of these muscles	C 2						
68		Practical performance	Examine the structure of deep muscle of the forearm with the help of color charts & models		P 4		Demo	1	OSPE	-
69		Values	Adopt the values of affective domain such as, integrity, respect, and advocacy			A 4	Role Play			
TOPIC: POSTERIOR COMPARTMENT OF FOREARM (EXTENSORS)										
70	Wee k-13	Introduction	Explain the extensors of the forearm	C 1			Interactive Lecture/SGD	2	MCQs/ SEQs	05
71		Physiology	Explain the physiology of the extensor muscle of the forearm	C 1						

72		Nerve innervation	Explain the nerve innervation to these muscles	C 2						
73		Superficial extensor muscle	Explain the superficial extensor muscles of the forearm	C 3						
74		Location of muscle	Explain the locations of these muscles	C 4						
75		Practical performance	Examine the structure of posterior compartment muscles of the forearm with the help of color charts & models		P 4		Demo	1	OSPE	01
76		SOPs compliance	Adopt how to take care of charts and models			A 4	Role Play			
TOPIC: INTRINSIC MUSCLES OF HAND										
77	Week-14	Introduction	Introduction to the intrinsic muscle of the hand	C 1			Interactive Lecture/SGD	2	MCQs/ SEQs	05
78		Thenar and Hypothenar muscles	Explain the thenar and Hypothenar muscles of HAND	C 2						
79		Lumbricals of HAND	Explain the lumbrical muscle of the HAND	C 3						
80		Palmar of HAND	Explain the palmar muscle of the HAND	C 4						
81		Dorsal interosseous of the HAND	Explain the dorsal interosseous muscle of the hand	C 4						
82		Practical performance	Examine the structure of small hand muscles with the help of color charts & models		P 4		Demo	1	OSPE	01
83		Emotions	Adopt the feeling of emotions, such as empathy, motivation, & confidence during procedure			A 4	Role Play			
TOPIC: MUSCLE OF THE LOWER LIMB										
84	Week-15	Introduction	Introduction to the muscle of the lower limb	C 1			Interactive Lecture/SGD	2	MCQs/ SEQs	05
85		Muscle of the hamstring group	Explain the muscle of the gluteal region and thigh	C 2						
86		Muscle of quadriceps group	Explain the function of the gluteal and thigh muscles	C 3						
87		Origin and insertion point	Explain the origin and insertion point of these muscles	C 3						
88		Connection to the hip joint	Illustrate the connection of these muscles to the hip joint	C 4						
89		Practical performance	Examine the structure of gluteal and thigh region muscles with the help of color charts & models		P 4		Demo	1	OSPE	01
90		Attitude	Adopt how to think about something, such as patient interest, appreciation, and enthusiasm			A 4	Role Play			
TOPIC: MUSCLE OF THE LOWER LIMB										

91	Week-16	Introduction	Introduction to the muscles of leg and foot	C 1			Interactive Lecture/SGD	2	MCQs/ SEQs	05
92		Physiology	Explain the physiology of these muscles	C 2						
93		Flexor & extensor of leg	Explain the flexors and extensors of leg muscles	C 3						
94		Deep muscle of leg	Explain the deep flexors and extensors muscle of the leg	C 3						
95		Practical performance	Examine the structure of leg & foot muscles with the help of color charts & models		P 4		Demo	1	OSPE	01
96		Ethical norms	Adopt how to take care of patient ethical norms			A 4	Role Play			

RECOMMENDED BOOKS; **NAME OF BOOK** **AUTHORS**

1	**Snell's Clinical Neuroanatomy**	Richard S. Snell
2	**Anatomy and Physiology for Nurses**	PR Ashalatha and G Deepa
3	**Medical Physiology**	Kim E. Barrett and Susan M. Barman

ASSESSMENT BREAKDOWN

S. No	TOPICS	No of MCQs	No of OSPE/OSCE STATIONS	STATIC/INTERACTIVE
1	INTRODUCTION TO MUSCULAR SYSTEM	03	01	Static
2	MUSCLE FIBER	05	01	Static
3	COMMON TERMS ASSOCIATED WITH MUSCLE	03	-	-
4	COMPARISON BETWEEN SKELETAL, SMOOTH AND CARDIAC MUSCLES	05	01	Static
5	CLASSIFICATION OF MUSCLES	05	01	Static
6	MUSCLE OF MASTICATION	03	01	Static
7	THE MUSCLE OF TRUNK	03	01	Static
8	MUSCLE OF THE SHOULDER GIRDLE	05	01	Static
9	MUSCLE OF THE ARM (FLEXORS)	05	01	Static
10	MUSCLES OF ARM (EXTENSORS)	05	01	Static
11	MUSCLE OF THE FOREARM	05	01	Interactive
12	DEEP MUSCLE OF FOREARM	03	-	-
13	POSTERIOR COMPARTMENT OF FOREARM (EXTENSORS)	05	01	Static
14	INTRINSIC MUSCLES OF HAND	05	01	Static
15	MUSCLE OF THE LOWER LIMB	05	01	Static
16	MUSCLE OF THE LOWER LIMB	05	01	Static

	TOTAL	**70**	**14**	

NEUR-627 Electroencephalography 3(2+1)

Course Description

This course will introduce the students to basic concepts in electroencephalography, 10/20 IS, artifacts, and the normal and abnormal patterns of different waves in EEG technology & its importance. Students will be able to understand how to interpret these electroencephalography results for seizure & Epileptiform pathology. This course will cover the different types of EEG recording, which contains neonatal EEG, pre-mature EEG, portable EEG & adult EEG recording. It also covers different clinical conditions faced in the daily routine of electrophysiological evaluation. It will help in developing the practical skill of students by determining the differential & final diagnosis during the neurophysiological procedures like routine EEG, Video EEG, Prolonged EEG, and sleep-deprived EEG.

Learning Objectives

Cognitive Domain

By the end of this course, students should be able to

1. Describe the techniques of the EEG procedure
2. Discuss the EEG procedure, its types, EEG findings, and interpretation
3. Explain the name of EEG patterns, normal variants, and abnormal variants of EEG waves
4. Describe EEG recording in ICU patients & its related problems in comatose patients
5. Demonstrate Epileptiform discharges & EEG recording in criminals

Psychomotor Domain

By the end of this course, students should be able to

1. Perform the procedure of recording the above abnormalities during EEG
2. Demonstrate the difference between focal & generalized seizure disorder during EEG
3. Perform clinical examination to know about any pathology related to central nervous tissue
4. Perform the recording of cerebral cortex activity during EEG & Video Monitoring
5. Perform all electrophysiological investigations independently
6. Perform clinical & differential diagnosis independently

Affective Domain

By the end of this course, students should be able to

1-Demonstrate punctuality

2. Follow the specified norms of the IL, SGD teaching & learning effectively

3. Demonstrate humbleness and use socially acceptable language during academic and social interactions with human models, colleagues, and teachers.
4. Demonstrate ethically competent decisions when confronted with an ethical, social, or moral problem in professional or personal life
5. Comply with SOPs of practical & procedure effectively

TABLE OF SPECIFICATION

TOS-ELECTROENCEPHALOGRAPHY 3(2+1)

S. No	Weeks	Contents	Learning Outcome	Domain C	Domain P	Domain A	MIT's	Time/ Hours	Assessment	No of Items
TOPIC: TECHNIQUE OF EEG										
1	Week-1	Introduction	Introduction to basic elements needed for the EEG electrodes, position of electrodes & application of electrodes	C 1			Interactive Lecture/CBL	2	MCQs	05
2		EEG machine introduction	Explain the electrode connections to the EEG machine & EEG machine introduction	C 2						
3		Calibration and montages	Explain the EEG calibration & montages	C 2						
4		Practical performance	Demonstrate the interpretation of EEG procedure independently		P 4		Demo	1	OSPE	01
5		Ethical norms	Adopt how to take care of patient ethical norms			A 4	Role Play			
TOPIC: NAME OF EEG RHYTHM/PATTERNS										
6	Week-2	Introduction	Introduction to the major frequency ranges of rhythms	C 1			Interactive Lecture/CBL	2	MCQs	05
7		Normal background rhythm	Describe normal background rhythms	C 3						
8		Abnormal pattern introduction	Explain abnormal pattern (introduction)	C 2						
9		Practical performance	Demonstrate the interpretation of EEG rhythm/pattern in epileptic patients		P 4		Demo	1	OSPE	01
10		Attitude	Adopt how to think about something, such as patient interest, appreciation, and enthusiasm			A 4	Role Play			
TOPIC: LOCALIZATION TECHNIQUES OF ELECTRODES										
11	Week-3	Introduction	Describe briefly the 10/20 International System	C 1			Interactive Lecture/CBL	2	MCQs	05
12		Referential recording	Discuss referential recording	C 2						
13		Bipolar recording	Explain bipolar recording	C 2						
14		Phase deflection	Discuss phase and direction of pen deflection	C 3						

15		Practical performance	Observe the 10/20 international electrode placement system during EEG procedure		P 4		Demo	1	OSPE	01
16		Ethical consideration	Adopt the need of informed consent, and rigorous ethical guidelines when using stimulation techniques			A 4	Role Play			
TOPIC: EEG ARTIFACTS										
17	Week-4	Introduction	Introduction to the muscle artifacts & 60 cycle	C 1			Interactive Lecture/CBL	2	MCQs/ SEQs	05
18		Types of artifacts	Explain electrode movement & eye movement artifacts	C 2						
19		Classes of artifacts	Discuss electrode pop, sweating & vascular artifacts	C 3						
20		Practical performance	Observe different EEG artifacts during EEG procedure		P 4		Demo	1	OSPE	01
21		SOPs compliance	Adopt how to take care of EEG machine			A 4	Role Play			
TOPIC: NORMAL RHYTHM OF EEG										
22	Week-5	Introduction	Introduction to the state of awareness, waking and sleep rhythms of EEG	C 1			Interactive Lecture/CBL	2	MCQs/ SEQs	05
23		Activating procedure of EEG	Explain the activating procedures of EEG e.g. HV, IPS & Sleep	C 2						
24		Premature EEG	Explain the premature EEG	C 3						
25		Neonates EEG	Explain the EEG of the neonates, young infants, and children (to adult) elderly	C 3						
26		Practical performance	Demonstrate the interpretation of normal pattern of EEG waves during EEG recording		P 4		Demo	1	OSPE	01
27		Values	Adopt the values of affective domain such as, integrity, respect, and advocacy			A 4	Role Play			
TOPIC: ABNORMAL EEG RHYTHM										
28	Week-6	Introduction	Introduction to the depression of normal rhythm, cautions, collection of fluid under electrodes & other conditions	C 1			Interactive Lecture/CBL	2	MCQs/ SEQs	05
29		Types of EEG waves (abnormal)	Explain the slow waves, diffuse and focal slow waves	C 2						
30		Spike & sharp waves of EEG	Explain sharp paroxysmal activity, spike, spike and wave complexes, sharp waves and controversial sharp waves or spikes	C 3						
31		Introduction of SEM	Explain SEM (slow eye movement) and triphasic waves	C 4						
32		Practical performance	Demonstrate the interpretation of abnormal pattern of EEG in neurological disorders		P 4		Demo	1	OSPE	01
33		Emotions	Adopt the feeling of emotions, such as empathy, motivation, &			A	Role Play			

			confidence during procedure			4				
TOPIC: ABNORMAL EEG RHYTHM										
34	Week-7	Introduction	Introduction to EEG pattern in SSPE (sub-acute sclerosing pan encephalitis)	C 1			Interactive Lecture/CBL	2	MCQs/ SEQs	05
35		Spindles & mitten waves	Explain the extreme spindles & mitten pattern	C 2						
36		Introduction of FAR	Explain FAR (frontal arousal rhythm)	C 3						
37		Associated clinical conditions	Explain the abnormal EEG patterns and associated clinical conditions	C 4						
38		Depression of normal EEG waves	Explain the depression of normal rhythms or slow waves	C 5						
39		Practical performance	Demonstrate the interpretation of abnormal pattern of EEG in SSPE patients		P 4		Demo	1	OSPE	01
40		Values	Adopt the values of affective domain such as, integrity, respect, and advocacy			A 4	Role Play			
TOPIC: ABNORMAL EEG RHYTHM										
41	Week-8	Introduction	Introduction to the sharp paroxysmal activity	C 1			Interactive Lecture/CBL	2	MCQs/ SEQs	05
42		EEG in encephalopathy	Explain abnormal EEG pattern in encephalopathy of metabolic, infectious & toxic etiologies	C 2						
43		EEG in vascular diseases	Explain the EEG pattern in vascular diseases of the cortex	C 3						
44		Practical performance	Demonstrate the interpretation of abnormal pattern of EEG in metabolic, infectious, and toxic etiologies		P 4		Demo	1	OSPE	01
45		Attitude	Adopt how to think about something, such as patient interest, appreciation, and enthusiasm			A 4	Role Play			
TOPIC: ABNORMAL EEG RHYTHM										
46	Week-9	Introduction	Introduction to EEG pattern in SOL (space occupying lesion)	C 1			Interactive Lecture/CBL	2	MCQs/ SEQs	03
47		EEG in senility	Explain the EEG pattern in senility	C 2						
48		EEG in mental disorders	Explain the EEG rhythm in learning or mental disabilities	C 3						
49		EEG in seizure disorders	Explain the EEG pattern in seizure disorder	C 3						
50		Practical performance	Demonstrate the interpretation of abnormal pattern of EEG in SOL, senility, learning and mental disable patients		P 4		Demo	1	OSPE	01
51		Emotions	Adopt the feeling of emotions, such as empathy, motivation, & confidence during procedure			A 4	Role Play			

TOPIC: EEG RECORDING IN ICU										
52	Week-10	Introduction	Introduction to EEG recording in ICU patients	C 1			Interactive Lecture/CBL	2	MCQs/ SEQs	05
53		EEG in comatose patients	Explain the recording clear activity in comatose patients	C 2						
54		EEG in ESC	Explain the recording of EEG in ESC (electro cerebral silence) patients in ICU	C 1						
55		EEG findings in ICU / Ventilator patients	Explain the EEG procedure in comatose patients							
56		Practical performance	Demonstrate the EEG interpretation in ICU patients		P 4		Demo	1	OSPE	01
57		Emotions	Adopt the feeling of emotions, such as empathy, motivation, & confidence during procedure			A 4	Role Play			
TOPIC: COMMON PROBLEMS IN EEG LABORATORY										
58	Week-11	Introduction	Introduction to the common problems between physician & technologist in EEG lab	C 1			Interactive Lecture/CBL	2	MCQs/ SEQs	03
59		EEG record	Explain the identification of EEG record	C 2						
60		History of the EEG patients	Explain the history of the patient	C 1						
61		Recording of EEG patients	Explain the sleep medication, waking record, seizure, sleep record, cleaning patient & spilling liquids on EEG machine	C 2						
62		Practical performance	Observe common problem in EEG Lab during EEG procedure		P 4		Demo	1	OSPE	-
63		Attitude	Adopt how to think about something, such as patient interest, appreciation, and enthusiasm			A 4	Role Play			
TOPIC: COMMON PROBLEMS BETWEEN REFERRING PHYSICIAN AND EEG LABORATORY										
64	Week-12	Introduction	Introduction to the EEG laboratory	C 1			Interactive Lecture/CBL	2	MCQs/ SEQs	03
65		Patient history taking	Explain the relevant history of the patient to the physician	C 2						
66		Permission of activating procedures	Explain the permission of HV, IPS & Sleep medication	C 1						
67		Verbal report of EEG patient	Explain the verbal report to the physician	C 2						
68		Practical performance	Observe common problem in EEG Lab b/w referring physician and EEG lab during EEG procedure		P 4		Demo	1	OSPE	01
69		Attitude	Adopt how to think about something, such as patient interest, appreciation, and enthusiasm			A 4	Role Play			
TOPIC: MEDICOLEGAL CASES AND EEG										

70	Week-13	Introduction	Explain the medico legal cases & EEG recording	C 1			Interactive Lecture/CBL	2	MCQs/ SEQs	03
71		Introduction of mental incompetency & insanity	Explain mental incompetency vs. insanity	C 1						
72		M'Naghten rules in medico legal cases	Explain the M'Naghten Rules in medico legal cases	C 2						
73		Legal evidence	Explain the EEG as Legal Evidence in medico legal cases	C 3						
74		EEG findings in head injury cases	Explain the EEG in head injury cases	C 4						
75		Practical performance	Observe common problem in EEG Lab during EEG procedure in medico legal cases		P 4		Demo	1	OSPE	01
76		Values	Adopt the values of affective domain such as, integrity, respect, and advocacy			A 4	Role Play			
TOPIC: EEG RECORDING IN CRIMINALS										
77	Week-14	Introduction	Introduction to the EEG abnormality in Criminals	C 1			Interactive Lecture/CBL	2	MCQs/ SEQs	03
78		EEG findings in post-traumatic epilepsy	Explain the EEG in post-traumatic epilepsy	C 2						
79		EEG in TLE	Explain possible relationship of temporal lobe epilepsy to violence	C 3						
80		Limitations of EEG in courtroom	Explain limitation of EEG in courtroom	C 4						
81		Practical suggestion in medico legal cases	Explain practical suggestions in medico legal cases	C 4						
82		Practical performance	Demonstrate EEG interpretation in criminal cases		P 4		Demo	1	OSPE	-
83		Ethical consideration	Adopt the need of informed consent, and rigorous ethical guidelines when using stimulation techniques			A 4	Role Play			
TOPIC: EPILEPTIFOM DISCHARGES										
84	Week-15	Introduction	Introduction to the Epileptiform discharges of EEG	C 1			Interactive Lecture/CBL	2	MCQs/ SEQs	05
85		Criteria for Epileptiform discharges	Explain the Criteria for these discharges of EEG	C 2						
86		Ictal and Interictal discharges	Explain the Ictal and Interictal discharges of EEG	C 3						
87		EEG findings in selected epileptic syndrome	Explain the EEG changes in selected epileptic syndrome	C 3						
88		Best timing of EEG recording	Illustrate the best timing of EEG recording	C 4						

89		Practical performance	Demonstrate interpretation of different Epileptiform pattern in EEG Lab during EEG procedure in hospital set up		P 4		Demo	1	OSPE	01
90		Ethical norms	Adopt how to take care of patient ethical norms			A 4	Role Play			
TOPIC: SERIES OF EEG IN DIAGNOSIS EPILEPSY										
91	Week-16	Introduction	Introduction to the multiple EEG's in diagnosis of epilepsy	C 1			Interactive Lecture/CBL	2	MCQs/ SEQs	05
92		Limitation of routine EEG	Explain the limitation of routine EEG	C 2						
93		Predictive value of EEG in medication withdrawal patients	Explain EEG predictive value for medication withdrawal	C 3						
94		Over interpretation of EEG recording	Explain the over interpretation of EEG and misdiagnosis of Epilepsy	C 3						
95		Practical performance	Demonstrate interpretation of different series of EEG in diagnosis of epilepsy		P 4		Demo	1	OSPE	01
96		Emotions	Adopt the feeling of emotions, such as empathy, motivation, & confidence during procedure			A 4	Role Play			

RECOMMENDED BOOKS; **NAME OF BOOK** **AUTHORS**

1	**Practical Guide for Clinical Neurophysiologic Testing EEG**	Thoru Yamada, MD and Elizabeth Meng
2	**Clinical Neurophysiology**	Jasper R. Daube and Devon I. Rubin
3	**Clinical Neurophysiology**	U.K. Misra and J. Kalita

ASSESSMENT BREAKDOWN

S. No	TOPICS	No of MCQs	No of OSPE/OSCE STATIONS	STATIC/INTERACTIVE
1	TECHNIQUE OF EEG	05	01	Static
2	NAME OF EEG RHYTHM/PATTERNS	05	01	Static
3	LOCALIZATION TECHNIQUES OF ELECTRODES	05	01	Static
4	EEG ARTIFACTS	05	01	Static
5	NORMAL RHYTHM OF EEG	05	01	Static
6	ABNORMAL EEG RHYTHM	05	01	Static
7	ABNORMAL EEG RHYTHM	05	01	Static
8	ABNORMAL EEG RHYTHM	05	01	Static
9	ABNORMAL EEG RHYTHM	03	01	Static
10	EEG RECORDING IN ICU	05	01	Static
11	COMMON PROBLEMS IN EEG LABORATORY	03	-	-
12	COMMON PROBLEMS BETWEEN REFERRING PHYSICIAN AND EEG	03	01	Interactive

	LABORATORY			
13	MEDICOLEGAL CASES AND EEG	03	01	Static
14	EEG RECORDING IN CRIMINALS	03	-	-
15	EPILEPTIFOM DISCHARGES	05	01	Static
16	SERIES OF EEG IN DIAGNOSIS EPILEPSY	05	01	Static
	TOTAL	**70**	**14**	

NEUR-628 Sleep Technology 3(2+1)

Course Description

This course will introduce the students to basic concepts of sleep, sleep technology, its stages, pathology, and functions related terms used in clinical neurophysiology & its importance. Students will be able to understand how interpret this terminology for sleep related breathing disorders, REM behavior disorders & obstructive sleep apneas pathology. This course will cover the different types of pathology, syndromes which affect the sleep pattern & its relation to other system involvement. It covers the therapeutic guidelines and the use of CPAP machine in OSA patients. It also covers different clinical conditions faced in daily routine electrophysiological evaluation. It will help in developing the practical skill of students by determining the differential & final diagnosis during the neurophysiological procedures like **PSG, MWT, MSLT**, NCS, **EMG,** RNS, EPs, & **EEG.**

Learning Objectives

Cognitive Domain

By the end of this course students should be able to

1. Describe the sleep, its different stages & electrophysiological changes during sleep
2. Discuss OSA & SRBDs, its types, PSG findings and its first aid treatment
3. Explain narcolepsy, cataplexy and bruxism & CPAP therapy
4. Describe MSLT & MWT & its related terminology, applications, and interpretations of these procedures
5. Demonstrate PSG, its types, clinical applications, scoring, montages & finally interpretation of PSG

Psychomotor Domain

By the end of this course students should be able to

1. Perform the procedure of recording the above abnormalities with the help of PSG
2. Demonstrate the difference between narcolepsy & cataplexy
3. Perform clinical examination to know about any pathology related to sleep disorders
4. Perform the recording of all physiological factors used in interpretation of PSG independently
5. Perform all electrophysiological investigations independently
6. Perform clinical & differential diagnosis independently

Affective Domain

By the end of this course students should be able to

1. Demonstrate punctuality

2. Follow the specified norms of the IL, SGD teaching & learning effectively
3. Demonstrate humbleness and use socially acceptable language during academic and social interactions with human models, colleagues, and teachers.
4. Demonstrate ethically competent decisions when confronted with an ethical, social, or moral problem in professional or personal life

TABLE OF SPECIFICATION

TOS-SLEEP TECHNOLOGY 3(2+1)

S. No	Weeks	Contents	Learning Outcome	Domain C	Domain P	Domain A	MIT's	Time/Hours	Assessment	No of Items
TOPIC: IMPORTANCE OF SLEEP										
1	Week-1	Introduction	Introduction to the importance of natural sleep	C 1			Interactive Lecture/SGD	2	MCQs	03
2		Strategies to get good sleep	Explain strategies to get good sleep	C 2						
3		Practical steps to get good natural sleep	Explain the practical steps to get good sleep	C 2						
4		Practical performance	Make sure practical steps to get enough good natural sleep with the help of color charts, models & videos		P 4		Demo	1	OSPE	-
5		Ethical norms	Adopt how to take care of patient ethical norms			A 4	Role Play			
TOPIC: CHARACTERISTICS OF SLEEP										
	Week-2	Introduction	Introduction to the characteristics of sleep	C 1			Interactive Lecture/CBL	2	MCQs	05
7		Stages of sleep	Describe different parts/stages of sleep	C 3						
8		Distribution of sleep stages	Explain the distribution of sleep stages	C 2						
9		Practical performance	Demonstrate the interpretation of stages of sleep during EEG recording		P 4		Demo	1	OSPE	01
10		SOPs compliance	Adopt how to take care of charts and models			A 4	Role Play			
TOPIC: SLEEP TECHNOLOGY										
11	Week-3	Introduction	Describe briefly sleep technology	C 1			Interactive Lecture/SGD	2	MCQs	03
12		Component of sleep technology	Discuss key components of sleep technology	C 2						
13		Future trends in sleep technology	Explain future trends in sleep technology	C 2						
14		Instruments used in sleep technology	Discuss the electrophysiological equipment's/instruments used in sleep technology	C 3						
15		Practical performance	Observe sleep technology instruments during PSG procedure		P		Demo	1	OSPE	01

					4					
16		Ethical consideration	Adopt the need of informed consent, and rigorous ethical guidelines when using stimulation techniques			A 4	Role Play			
TOPIC: OBSTRUCTIVE SLEEP APNEA (OSA)										
17	Week-4	Introduction	Introduction to the OSA	C 1			Interactive Lecture/CBL	2	MCQs/ SEQs	05
18		Anatomical factors of OSA	Explain the anatomical factors of OSA	C 2						
19		Diagnostic criteria of OSA	Discuss the diagnostic criteria for OSA	C 3						
20		Practical performance	Demonstrate the interpretation of PSG findings in OSA patients		P 4		Demo	1	OSPE	01
21		Values	Adopt the values of affective domain such as, integrity, respect, and advocacy			A 4	Role Play			
TOPIC: OSA (Obstructive Sleep Apnea)										
22	Week-5	Introduction	Introduction to different terms associated with OSA	C 1			Interactive Lecture/CBL	2	MCQs/ SEQs	05
23		Syndrome associated with OSA	Explain different syndromes associated with OSA	C 2						
24		Non-structural factors of OSA	Explain non-structural factors of OSA	C 3						
25		Conservative & surgical management for OSA	Explain the conservative & surgical treatment of OSA	C 3						
26		Practical performance	Observe the clinical features of non-structural factors of OSA with the help of color charts & models		P 4		Demo	1	OSPE	01
27		Attitude	Adopt how to think about something, such as patient interest, appreciation, and enthusiasm			A 4	Role Play			
TOPIC: REM BEHAVIOR DISORDERS										
28	Week-6	Introduction	Explain the REM behavior disorder	C 1			Interactive Lecture/CBL	2	MCQs/ SEQs	03
29		Restless leg syndrome (RLS)	Explain the restless leg syndrome	C 2						
30		Sleep paralysis	Explain nocturnal myoclonus and sleep paralysis	C 3						
31		Bruxism	Describe bruxism in children and its causes	C 3						
32		Practical performance	Demonstrate the PSG interpretation in REM behavior disorders patients		P 4		Demo	1	OSPE	01
33		Attitude	Adopt how to think about something, such as patient interest, appreciation, and enthusiasm			A 4	Role Play			

TOPIC: SLEEP RELATED BREATHING DISORDER (SRBD)										
34	Week-7	Introduction	Introduction to the SRBD	C 1			Interactive Lecture/SGD/CBL	2	MCQs/ SEQs	10
35		Physical findings of SRBD	Explain the common physical findings of SRBD	C 2						
36		Signs & symptoms of SRBD	Explain the common signs and symptoms of SRBD	C 3						
37		Types of OSA	Explain the different types of respiratory events related to OSA & SRBD	C 4						
38		Pathophysiology of OSA	Explain the pathophysiology of these events	C 5						
39		Practical performance	Observe the clinical features in SRBDs patients during PSG		P 4		Demo	1	OSPE	02
40		Values	Adopt the values of affective domain such as, integrity, respect, and advocacy			A 4	Role Play			
TOPIC: EXCESSIVE DAYTIME SLEEPINESS (EDS)										
41	Week-8	Definition	Introduction to the EDS	C 1			Interactive Lecture/CBL	2	MCQs/ SEQs	03
42		ESS (Introduction)	Explain Epworth sleepiness scale (ESS)	C 2						
43		Physical examination during ESS	Explain physical examination during ESS recording	C 3						
44		Practical performance	Demonstrate the interpretation of PSG in EDS & ESS patients		P 4		Demo	1	OSPE	01
45		SOPs compliance	Adopt how to take care of PSG machine			A 4	Role Play			
TOPIC: NARCOLEPSY AND CATAPLEXY										
46	Week-9	Introduction	Introduction to the narcolepsy and cataplexy	C 1			Interactive Lecture/CBL	2	MCQs/ SEQs	03
47		Pathophysiology	Explain the pathophysiology of narcolepsy and cataplexy	C 2						
48		Signs & symptoms of narcolepsy and cataplexy	Explain the signs and symptoms of narcolepsy and cataplexy	C 3						
49		Diagnostic tools for narcolepsy	Explain the diagnostic tools for narcolepsy and cataplexy	C 3						
50		Practical performance	Demonstrate the interpretation of PSG in narcolepsy and cataplexy patients		P 4		Demo	1	OSPE	01
51		Values	Adopt the values of affective domain such as, integrity, respect, and advocacy			A 4	Role Play			
TOPIC: MULTIPLE SLEEP LATECY TEST (MSLT)										

52	Week-10	Introduction	Introduction to the MSLT	C 1			Interactive Lecture/CBL	2	MCQs/ SEQs	05
53		Procedure of MSLT	Explain how to perform MSLT?	C 2						
54		MSLT findings	Explain the MSLT findings & recommendation in narcolepsy	C 1						
55		Interpretation of MSLT	Explain the interpretation of MSLT							
56		Practical performance	Demonstrate the interpretation of MSLT in different patients of epilepsy		P 4		Demo	1	OSPE	01
57		Ethical norms	Adopt how to take care of patient ethical norms			A 4	Role Play			
TOPIC: MAINTENANCE OF WAKEFULNESS TEST (MWT)										
58	Week-11	Introduction	Introduction to the MWT	C 1			Interactive Lecture/CBL	2	MCQs/ SEQs	05
59		Standardization of MWT	Explain the standardization of MWT	C 2						
60		Objectives of MWT	Explain the objectives of MWT	C 1						
61		Standard parameters of MWT	Explain the standard parameters, montages, factor affecting study and scoring of MWT	C 2						
62		Practical performance	Demonstrate the interpretation of MWT in neurological patients		P 4		Demo	1	OSPE	01
63		Ethical consideration	Adopt the need of informed consent, and rigorous ethical guidelines when using stimulation techniques			A 4	Role Play			
TOPIC: POLYSOMNOGRAPHY (PSG)										
64	Week-12	Introduction	Explain PSG and its indications	C 1			Interactive Lecture/CBL/SGD	2	MCQs/ SEQs	04
65		Patient evaluation during PSG	Explain patient evaluation and instruction for PSG	C 2						
66		Components of PSG	Explain the components of PSG	C 1						
67		Derived information from PSG	Explain the derived information from PSG procedure	C 2						
68		Practical performance	Demonstrate the interpretation of PSG in OSA patients		P 4		Demo	1	OSPE	01
69		Emotions	Adopt the feeling of emotions, such as empathy, motivation, & confidence during procedure			A 4	Role Play			
TOPIC: POLYSOMNOGRAPHY TYPES										
70	Week-13	Introduction	Introduction to the types of PSG	C 1			Interactive Lecture/CBL	2	MCQs/ SEQs	05

71		Diagnosis of SRBD from PSG recording	Explain SRBDs based on PSG recording	C 1						
72		Physiological recording of PSG	Explain the physiological recording of PSG	C 2						
73		AASM criteria for PSG	Explain AASM (American Association for Sleep Medicine) criteria for diagnosing OSA	C 3						
74		Limitation of PSG	Explain limitations of PSG recording	C 4						
75		Practical performance	Demonstrate the interpretation of PSG procedure in REM behavior disorder patients		P 4		Demo	1	OSPE	01
76		Attitude	Adopt how to think about something, such as patient interest, appreciation, and enthusiasm			A 4	Role Play			
TOPIC: PSG SCORING										
77	Week-14	Introduction	Introduction to scoring of PSG	C 1			Interactive Lecture/CBL	2	MCQs/ SEQs	05
78		Sleep architecture	Explain the sleep architecture during PSG recording	C 2						
79		Clinical application of PSG	Explain the clinical applications of PSG	C 3						
80		Types of montages during PSG	Explain the different types of montages in PSG	C 4						
81		PSG scoring	Illustrate what would you look for PSG scoring	C 4						
82		Practical performance	Demonstrate the interpretation of PSG scoring in OSA patients		P 4		Demo	1	OSPE	01
83		Emotions	Adopt the feeling of emotions, such as empathy, motivation, & confidence during procedure			A 4	Role Play			
TOPIC: PSG INTERPRETATION										
84	Week-15	Introduction	Introduction to scoring of PSG	C 1			Interactive Lecture/CBL	2	MCQs/ SEQs	03
85		Components	Describe components of hypnogram	C 2						
86		Total respiratory events during PSG	Explain the total respiratory events during PSG	C 3						
87		Arousal index in PSG	Explain the arousal index in PSG	C 3						
88		Sleep latencies during PSG	Explain the different sleep latencies recording during PSG	C 4						
89		Practical performance	Demonstrate the PSG interpretation in OSA patients		P 4		Demo	1	OSPE	-

90		Emotions	Adopt the feeling of emotions, such as empathy, motivation, & confidence during procedure			A 4	Role Play			
TOPIC: CPAP AND APAP THERAPY										
91	Week-16	Introduction	Introduction to CPAP, BiPAP & APAP	C 1			Interactive Lecture/CBL	2	MCQs/ SEQs	03
92		Parameters	Explain parameters of CPAP and APAP	C 2						
93		Indications	Explain indications of CPAP therapy	C 3						
94		Contraindications	Explain contraindications of CPAP, BiPAP & APAP therapy	C 3						
95		Practical performance	Observe the CPAP therapy procedure in OSA patients		P 4		Demo	1	OSPE	-
96		SOPs compliance	Adopt how to take care of CPAP machine			A 4	Role Play			

RECOMMENDED BOOKS; **NAME OF BOOK** **AUTHORS**

1	**Introduction to Modern Sleep Technology**	Shih Chung (Jessy) Kang
2	**Clinical Neurophysiology**	Jasper R. Daube and Devon I. Rubin
3	**Clinical Neurophysiology**	U.K. Misra and J. Kalita

ASSESSMENT BREAKDOWN

S. No	TOPICS	No of MCQs	No of OSPE/OSCE STATIONS	STATIC/INTERACTIVE
1	IMPORTANCE OF SLEEP	03	-	-
2	CHARACTERISTICS OF SLEEP	05	01	Static
3	SLEEP TECHNOLOGY	03	01	Static
4	OBSTRUCTIVE SLEEP APNEA (OSA)	05	01	Static
5	OSA (Obstructive Sleep Apnea)	05	01	Static
6	REM BEHAVIOR DISORDERS	03	01	Static
7	SLEEP RELATED BREATHING DISORDER (SRBD)	10	02	Static
8	EXCESSIVE DAYTIME SLEEPINESS (EDS)	03	01	Static
9	NARCOLEPSY AND CATAPLEXY	03	01	Static
10	MULTIPLE SLEEP LATECY TEST (MSLT)	05	01	Static
11	MAINTENANCE OF WAKEFULNESS TEST (MWT)	05	01	Interactive
12	POLYSOMNOGRAPHY (PSG)	05	01	Static
13	POLYSOMNOGRAPHY TYPES (PSG)	05	01	Static

14	PSG SCORING	04	-	-
15	PSG INTERPRETATION	03	-	-
16	CPAP AND APAP THERAPY	03	01	Static
	TOTAL	**70**	**14**	

THE END