MALLA REDDY VISHWAVIDYAPEETH

SCHOOL OF ALLIED HEALTH CARE SCIENCES AND TECHNOLOGY

Suraram X Roads, Jeedimetla,
Hyderabad-500055
Web: https://mrvv.edu.in/

Program Master of Science(M.Sc.)

Neuroscience Technology

2026

MALLA REDDY VISHWAVIDYAPEETH

SCHOOL OF ALLIED HEALTH CARE SCIENCES AND TECHNOLOGY

Master of Neuroscience Technology

Vision

To become a center of excellence in Neuroscience education and research by developing skilled professionals capable of advancing knowledge of the nervous system, neurological disorders, and neurodiagnostic
technologies for the benefit of healthcare and society.

Mission

1. To provide strong theoretical and practical training in neuroscience and neurodiagnostic sciences.
2. To promote interdisciplinary learning integrating biology, medicine, psychology, pharmacology, and technology.
3. To develop research aptitude and scientific thinking among students.
4. To train students in clinical, laboratory, and neurodiagnostic techniques.
5. To encourage ethical practices, innovation, and lifelong learning in neuroscience and healthcare.

Program Educational Objectives (PEOs)

Graduates will:

- Acquire advanced knowledge of nervous system structure, function, disorders, and neurobiological mechanisms.
- Develop competency in neurodiagnostic techniques, laboratory procedures, and clinical neuroscience applications.
- Demonstrate analytical, research, and problem-solving skills in neuroscience and related interdisciplinary areas.
- Apply ethical principles and professional practices in clinical, research, and academic environments.
- Pursue higher education, research, healthcare, and industry careers in neuroscience and allied disciplines.

Program Outcomes (POs)

Students will:

- Demonstrate comprehensive knowledge of neuroanatomy, neurophysiology, neuropharmacology, neurogenetics, and clinical neuroscience.
- Perform neurodiagnostic and laboratory techniques including EEG, EMG, nerve conduction studies, and neuroimaging interpretation.
- Analyze neurological problems using scientific reasoning and evidence-based approaches.
- Design, conduct, analyze, and present neuroscience research studies using appropriate methodologies and statistical tools.
- Integrate neuroscience concepts into clinical and healthcare settings for understanding neurological disorders.
- Communicate scientific and clinical information effectively through presentations, reports, and publications.
- Apply ethical principles in patient care, laboratory work, and neuroscience research.

Program Specific Outcomes (PSOs)

Students can:

- Identify and explain the structural and functional organization of the nervous system.
- Perform and interpret neurodiagnostic procedures such as EEG, EMG, evoked potentials, and basic neuroimaging studies.
- Analyze neurological and neurobehavioral disorders using clinical and laboratory approaches.
- Utilize modern neuroscience tools, research methodologies, and statistical techniques for scientific investigations.
- Work effectively in hospitals, neurodiagnostic laboratories, research institutes, pharmaceutical industries, and academic institutions.
- Conduct independent research and contribute to advancements in Neuroscience and allied healthcare sciences.

Program Outcomes

1. Understand the structure and function of the nervous system.
2. Apply neuroscience concepts to behavior and brain disorders.
3. Perform basic laboratory and research techniques.
4. Analyze and interpret scientific data.
5. Use modern neuroscience tools and technologies.
6. Communicate scientific ideas effectively.
7. Work collaboratively in healthcare and research teams.

MALLA REDDY
VISHWAVIDYAPEETH
(Deemed to be University)

MALLA REDDY VISHWAVIDYAPEETH

SCHOOL OF ALLIED HEALTH CARE SCIENCES AND TECHNOLOGY

Master of Neuroscience Technology

COURSE STRUCTURE

I year I semester

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	Max. Marks		
							INT	EXT	TOTAL
1		Advanced Neuroanatomy	3			3	40	60	100
2		Neurophysiology	3			3	40	60	100
3		Fundamentals of Neurodiagnostic Techniques	3			3	40	60	100
4		Neuropharmacology	3			3	40	60	100
5		Practical: Neuro diagnostics			4	2	40	60	100
6		Clinical postings 1			16	8	40	60	100
TOTAL			**12**		**20**	**22**	**240**	**360**	**600**

I year II semester

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	Max. Marks		
							INT	EXT	TOTAL
1		Neuroimaging Techniques	4			4	40	60	100
2		Electrophysiology	4			4	40	60	100
3		Neurophysiological Monitoring	3			3	40	60	100
4		Cognitive Neuroscience	3			3	40	60	100
5		Practical: Neuroimaging Techniques			4	2	40	60	100
6		Clinical Postings 2			12	6	40	60	100
TOTAL			**14**		**16**	**22**	**240**	**360**	**600**

II-year III semester

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	Max. Marks		
							INT	EXT	TOTAL
1		Neurological Disorders and Treatments	4			4	40	60	100
2		Clinical Neurophysiology	4			4	40	60	100
3		Rehabilitation in Neuroscience	3			3	40	60	100
4		Advanced EEG and EMG Techniques	3			3	40	60	100
5		Practical: Clinical Neurophysiology			4	2	40	60	100
6		Clinical postings 3			12	6	40	60	100
TOTAL			**14**		**16**	**22**	**240**	**360**	**600**

II year IV semester

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	Max. Marks		
							INT	EXT	TOTAL
1		Neurocritical Care	3			3	40	60	100
2		Neuroinformatics	3			3	40	60	100
3		Research Methodology and Biostatistics	3			3	40	60	100
4		Thesis/Research Project			12	6	40	60	100
5		Practical: Neurocritical Monitoring Techniques			4	2	40	60	100
6		Clinical posting 4			10	5	40	60	100
TOTAL			**9**		**26**	**22**	**240**	**360**	**600**

1.1 Post Graduate Programme

Sl. No.	Course	Duration	Eligibility for admission
1	M.Sc. Neuroscience Technology	2 years	He/she has passed the BSc in Neuroscience Technology or equivalent examination of a recognized Indian University or a duly constituted Board with pass marks (50%).

1.2Medium of Instruction:

English shall be the medium of instruction for all subjects of study and for examinations.

1.3Duration of the Course

Duration details are mentioned under clause no. 1.1 of this booklet.

1.4 Examination Regulations

1.4.1 Attendance: 80% of attendance (physical presence) is mandatory.

Medical leave or other types of sanctioned leaves will not be counted as physical presence. Attendance will be counted from the date of commencement of the session to the last day of the closing of attendance before the final examination.

1.4.2 Internal Assessments:

a) Regular periodic assessment shall be conducted throughout the course. In each semester there will be **two one-hour internal assessments (15 marks each)** and a continuous assessment (10 marks). Thus, a total of 40 marks for the internal exam. (i.e. weightage for internal assessment shall be 40% of the total marks in each subject).

b) **Exam pattern for internal assessment** in each semester will be

(a) Short questions 3 nos. each carrying 5 marks (i.e. 3 x 5=15 marks). Two such internal examinations will be conducted.

(b) Continuous assessment of the student will be done. Students' overall attendance, performance in class, behaviour of the student, presentations, extra-curricular activities etc will be assessed. Continuous assessment carries 10 marks.

(d) Thus, a total of 40 marks for the internal examination. (15+15+10=40 marks). A candidate should secure a minimum of 40% marks in the internal assessment in each subject to be eligible to appear for the University examination

(e) For value added courses, only internal examination will be conducted. The assessment comprised of five assignments/presentations/case presentations each carrying 10 (i.e. 5 x 10 = 50 marks). Final examination will be for 50 marks with 5 questions each carrying 10 marks (5 x 10

= 50 marks). The minimum pass is 40% marks.

1.4.3 University Examinations (External):

a) University Examination shall be conducted at the end of every semester.

b) A candidate who satisfies the requirement of attendance and internal assessment marks, as stipulated by the University shall be eligible to appear for the University Examination.

c) Examination will be of 3 hours duration (for theory). The question pattern for those subjects without practical examination (60 marks) will be (a) Three essay questions out of which the student should answer 2 questions each carrying 10 marks (i.e. 2 x 10 = 20 marks) (b) Eight short note questions out of which the student should attempt six questions, each carrying 5 marks (6 x 5 = 30 marks). (c) Ten very short questions each carrying 1 mark (i.e. 10 x 1 = 10 marks). Thus, a total of 60 marks.

d) The question pattern for practical examination (a) Spotters/major practical/minor practical/case presenting/Viva/practical/log record.

The minimum pass for internal assessment is 40% and for the University Examination is 50%. i.e. a student should score a total of 50% (adding the internal and external examination) to pass in each subject.

MALLA REDDY
VISHWAVIDYAPEETH
(Deemed to be University)

SEMESTER - I

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	Max. Marks		
							INT	EXT	TOTAL
1		Advanced Neuroanatomy	3			3	40	60	100
2		Neurophysiology	3			3	40	60	100
3		Fundamentals of Neurodiagnostic Techniques	3			3	40	60	100
4		Neuropharmacology	3			3	40	60	100
5		Practical: Neuro diagnostics			4	2	40	60	100
6		Clinical postings 1			16	8	40	60	100
TOTAL			12		20	22	240	360	600

MALLA REDDY VISHWAVIDYAPEETH (Deemed to be University)

ADVANCED NEUROANATOMY (45 HOURS) L/T/P/C 3/-/-/3

Learning Objectives

- To understand the detailed anatomy of the nervous system.
- To correlate neuroanatomical structures with functional and clinical aspects.
- To develop foundational knowledge for clinical neuroscience.

Learning Outcomes

After completion, the student will be able to:

- Describe gross and microscopic anatomy of the nervous system.
- Explain sensory and motor pathways and their clinical significance.
- Identify cranial nerves and explain their functions.
- Correlate lesions in specific neuroanatomical regions with neurological deficits

Unit I — General Organization of Nervous System (9 HOURS)

- Introduction to nervous system
- Neurons and neuroglia
- Synapse and neural communication
- Central and peripheral nervous systems
- Functional divisions of nervous system

Unit II — Spinal Cord and Brainstem((9 HOURS)

- Gross anatomy of spinal cord
- Ascending and descending tracts
- Medulla oblongata
- Pons and midbrain
- Cranial nerves and nuclei

Unit III — Cerebellum and Diencephalon (9 HOURS)

- Anatomy and functions of cerebellum
- Thalamus and hypothalamus
- Limbic system
- Basal ganglia

Unit IV — Cerebral Cortex (9 HOURS)

- Cerebral hemispheres
- Functional areas of cerebral cortex
- White matter connections
- Ventricular system and CSF circulation

Unit V — Clinical Neuroanatomy (9 HOURS)

- Blood supply of brain
- Stroke syndromes
- Neuroanatomical basis of movement disorders
- Localization of lesions
- Clinical case discussions

MALLA REDDY VISHWAVIDYAPEETH (Deemed to be University)

Recommended Books

1. Snell's Clinical Neuroanatomy
2. Clinical Neuroanatomy
3. Neuroanatomy Through Clinical Cases
4. Gray's Anatomy

NEUROPHYSIOLOGY (45 HOURS) **L/T/P/C**
3/-/-/3

Learning Objectives

- To understand physiological mechanisms of the nervous system.
- To study neuronal communication and neural integration.
- To correlate physiological principles with neurological functions.

Learning Outcomes
After completion, the student will be able to:

- Explain generation and propagation of nerve impulses.
- Describe synaptic transmission and neurotransmission mechanisms.
- Interpret reflexes and motor control mechanisms.
- Explain physiology of special senses and higher brain functions.

Unit I — Cellular Neurophysiology(9 HOURS)

- Resting membrane potential
- Action potential
- Ion channels
- Synaptic transmission
- Neurotransmitters

Unit II — Sensory Physiology(9 HOURS)

- Somatosensory pathways
- Pain mechanisms
- Visual physiology
- Auditory physiology
- Taste and olfactory pathways

Unit III — Motor Physiology(9 HOURS)

- Motor pathways
- Reflex mechanisms
- Muscle spindle and Golgi tendon organ
- Basal ganglia functions
- Cerebellar coordination

Unit IV — Autonomic Nervous System(9 HOURS)

- Sympathetic nervous system
- Parasympathetic nervous system
- Autonomic reflexes
- Hypothalamic regulation

Unit V — Higher Functions of Brain(9 HOURS)

- Sleep and EEG
- Learning and memory
- Language and speech
- Emotion and behavior
- Neural plasticity

Reference Books

1. Guyton and Hall Textbook of Medical Physiology
2. Ganong's Review of Medical Physiology
3. Principles of Neural Science

4. Medical Physiology

FUNDAMENTALS OF NEURODIAGNOSTIC TECHNIQUES (60 HOURS)

L/T/P/C
3/-/-/3

Learning Objectives

- To introduce neurodiagnostic procedures and instrumentation.
- To understand electrophysiological and imaging techniques.
- To develop interpretation skills in neuro diagnostics.

Learning Outcomes

After completion, the student will be able to:

- Describe principles of EEG, EMG, NCV, EP, and polysomnography.
- Identify indications and contraindications of neurodiagnostic procedures.
- Demonstrate proper patient preparation and electrode placement techniques.

Unit I — Introduction to Neurodiagnostics (9 HOURS)

- Principles of neurodiagnosis
- Patient preparation
- Safety measures and ethics
- Basic instrumentation

Unit II — Electroencephalography (EEG) (9 HOURS)

- EEG instrumentation
- Electrode placement system
- Brain wave patterns
- EEG recording techniques
- Clinical applications of EEG

Unit III — Electromyography and Nerve Conduction Studies(9 HOURS)

- Principles of EMG
- Motor and sensory nerve conduction
- Electrode applications
- Clinical significance

Unit IV — Neuroimaging Techniques(9 HOURS)

- CT scan
- MRI and functional MRI
- PET and SPECT
- Contrast agents and safety

Unit V — Evoked Potentials and Advanced Techniques(9 HOURS)

- Visual evoked potentials
- Auditory evoked potentials
- Somatosensory evoked potentials
- Sleep studies
- Emerging neurodiagnostic technologies
-

Reference Books

1. Electrodiagnosis in Diseases of Nerve and Muscle
2. Current Practice of Clinical Electroencephalography
3. Atlas of EEG in Critical Care
4. MRI Made Easy

NEUROPHARMACOLOGY (60 HOURS) **L/T/P/C 3/-/-/3**

Learning Objectives

- To understand pharmacological principles related to nervous system function.
- To study mechanisms of action of neuroactive drugs.
- To understand pharmacotherapy of neurological disorders.

Learning Outcomes

After completion, the student will be able to:

- Classify major neuropharmacological agents.
- Explain mechanisms of action of CNS and PNS drugs.
- Describe indications, contraindications, side effects, and interactions of neurological medications.

MALLA REDDY VISHWAVIDYAPEETH (Deemed to be University)

Unit I — General Principles of Neuropharmacology(9 HOURS)

- Pharmacokinetics
- Pharmacodynamics
- Blood-brain barrier
- Drug receptors
- Adverse drug reactions

Unit II — Neurotransmitter Pharmacology(9 HOURS)

- Cholinergic system
- Dopaminergic system
- Serotonergic system
- GABAergic and glutamatergic systems

Unit III — Drugs Affecting Central Nervous System(9 HOURS)

- Sedatives and hypnotics
- Antipsychotics
- Antidepressants
- Anxiolytics
- CNS stimulants

Unit IV — Drugs for Neurological Disorders(9 HOURS)

- Antiepileptic drugs
- Antiparkinsonian drugs
- Drugs for Alzheimer's disease
- Analgesics and anesthetics

Unit V — Recent Advances in Neuropharmacology(9 HOURS)

- Neuroprotective agents
- Drug addiction and dependence
- Personalized medicine
- Emerging neurotherapeutics

Reference Books

1. Goodman & Gilman's The Pharmacological Basis of Therapeutics
2. Basic and Clinical Pharmacology
3. Introduction to Neuropsychopharmacology
4. Rang and Dale's Pharmacology

PRACTICAL 1: NEURO DIAGNOSTICS (30 HOURS)

L/T/P/C
-/-/4/2

Learning Objectives

- To provide hands-on training in neurodiagnostic procedures.
- To develop technical skills in handling neurodiagnostic equipment.
- To enhance patient communication and procedural competence.
- To practice recording and documentation of neurophysiological data.

Learning Outcomes

After completion, the student will be able to:

- Perform basic EEG, EMG, and nerve conduction setup procedures.
- Demonstrate correct electrode application and calibration methods.
- Maintain infection control and patient safety standards.

1. EEG Laboratory Orientation
2. Recording of Normal EEG Activity
3. Interpretation of Basic EEG Waveforms
4. Motor Nerve Conduction Study (NCS)
5. Sensory Nerve Conduction Study (NCS)
6. Electromyography (EMG) Recording – Surface EMG
7. Cranial nerve screening
8. Motor and sensory examination
9. Reflex testing and coordination assessment

RECOMMENDED BOOKS

- Principles of Neural Science
- Guyton and Hall Textbook of Medical Physiology
- Neuroanatomy Through Clinical Cases
- Snell's Clinical Neuroanatomy
- Adams and Victor's Principles of Neurology
-

CLINICAL POSTINGS 1 (120 HOURS)

L/T/P/C
-/-/16/8

Learning Objectives

- To provide hands-on clinical exposure to neurological patients and neurodiagnostic laboratories.
- To correlate theoretical knowledge with real clinical cases.
- To develop skills in patient assessment, neurodiagnostic procedures, and interpretation.
- To understand workflow in neurology, neurophysiology, and imaging units.

Learning Outcomes

After completion, the student will be able to:

- Take basic neurological history from patients.
- Observe and assist in neurological examinations and diagnostic procedures.
- Demonstrate professional behavior and ethical patient interaction.
- Correlate clinical symptoms with neurological conditions.

MALLA REDDY
VISHWAVIDYAPEETH
(Deemed to be University)

Posting Units / Departments

Students will rotate through the following units:

- Neurology OPD & Ward
- Neurosurgery Unit
- Neurophysiology Laboratory (EEG/EMG/NCS)
- Neuroimaging Department (CT/MRI)
- Neurocritical Care Unit (ICU)
- Rehabilitation Medicine Unit

SEMESTER – II

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	Max. Marks		
							INT	EXT	TOTAL
1		Neuroimaging Techniques	4			4	40	60	100
2		Electrophysiology	4			4	40	60	100
3		Neurophysiological Monitoring	3			3	40	60	100
4		Cognitive Neuroscience	3			3	40	60	100
5		Practical: Neuroimaging Techniques			4	2	40	60	100
6		Clinical Postings 2			12	6	40	60	100
TOTAL			**14**		**16**	**22**	**240**	**360**	**600**

NEUROIMAGING TECHNIQUES (60 HOURS)

L/T/P/C

4/-/-/4

Learning Objectives

- To understand principles and applications of neuroimaging techniques.
- To develop basic skills in interpretation of neuroimaging findings.
- To correlate imaging findings with neurological disorders.

Learning Outcomes

After completion, the student will be able to:

- Describe principles of CT, MRI, fMRI, PET, and angiographic imaging techniques.
- Identify normal neuroanatomical structures in neuroimages.
- Explain indications and limitations of different neuroimaging modalities

Unit I — Introduction to Neuroimaging (12 HOURS)

- Principles of medical imaging
- Anatomy relevant to neuroimaging
- Radiation safety and contrast agents
- Imaging modalities overview

Unit II — Computed Tomography (CT) (12 HOURS)

- Principles of CT imaging
- CT instrumentation
- Contrast and non-contrast CT

- Clinical applications in neurological disorders
- Interpretation of normal and abnormal CT images

Unit III — Magnetic Resonance Imaging (MRI) **(12 HOURS)**

- Physics of MRI
- MRI sequences and protocols
- Functional MRI (fMRI)
- Diffusion tensor imaging (DTI)
- MRI interpretation

Unit IV — Advanced Neuroimaging Techniques **(12 HOURS)**

- Positron emission tomography (PET)
- Single-photon emission computed tomography (SPECT)
- Magnetic resonance spectroscopy (MRS)
- Angiography techniques

Unit V — Clinical Applications **(12 HOURS)**

- Imaging in stroke
- Neurodegenerative diseases
- Brain tumors
- Epilepsy imaging
- Imaging in psychiatric disorders

Reference Books

1. MRI Made Easy
2. Neuroimaging: The Essentials
3. Clinical MRI
4. Diagnostic Neuroradiology

MALLA REDDY VISHWAVIDYAPEETH (Deemed to be University)

ELECTROPHYSIOLOGY (60 HOURS)

L/T/P/C

4/-/-/4

Learning Objectives

- To understand electrical properties of neurons and neural tissues.
- To study electrophysiological recording techniques.
- To apply electrophysiological principles in neuroscience research and clinical practice.

Learning Outcomes

After completion, the student will be able to:

- Explain principles of neural electrical activity and signal conduction.
- Describe electrophysiological techniques such as EEG, EMG, NCV, and evoked

potentials.
- Demonstrate understanding of signal acquisition and recording methods.
- Identify normal and abnormal electrophysiological patterns.

Unit I — Basic Principles of Electrophysiology (12 HOURS)

- Bioelectricity
- Resting membrane potential
- Action potential
- Ion channels and membrane conductance
- Synaptic transmission

Unit II — Electrophysiological Recording Techniques(12 HOURS)

- Intracellular and extracellular recordings
- Patch clamp techniques
- Amplifiers and electrodes
- Signal acquisition systems

Unit III — Electroencephalography (EEG) (12 HOURS)

- EEG instrumentation
- Electrode placement systems
- Brain wave patterns
- Clinical applications of EEG

Unit IV — Electromyography and Evoked Potentials (12 HOURS)

- Electromyography (EMG)
- Nerve conduction studies
- Visual evoked potentials
- Auditory and somatosensory evoked potentials

Unit V — Clinical and Research Applications (12 HOURS)

- Electrophysiology in epilepsy
- Sleep electrophysiology
- Brain-computer interfaces
- Electrophysiology in cognitive research

Reference Books

1. Principles of Neural Science
2. Medical Physiology
3. Current Practice of Clinical Electroencephalography
4. Ion Channels of Excitable Membranes

MALLA REDDY VISHWAVIDYAPEETH (Deemed to be University)

NEUROPHYSIOLOGICAL MONITORING (45 HOURS)

L/T/P/C
3/-/-/3

Learning Objectives

- To understand principles and techniques of neurophysiological monitoring.
- To study monitoring methods used in critical care and surgery.
- To interpret neurophysiological data for clinical decision-making.

Learning Outcomes

After completion, the student will be able to:

- Describe modalities used in neurophysiological monitoring.
- Explain indications and procedures for intraoperative monitoring.
- Demonstrate understanding of monitoring equipment and alarm systems.

Unit I — Introduction to Neurophysiological Monitoring(9 HOURS)

- Concepts and objectives
- Monitoring instrumentation
- Patient safety and ethics
- Physiological signal acquisition

Unit II — EEG Monitoring (9 HOURS)

- Continuous EEG monitoring
- ICU EEG applications
- Monitoring in epilepsy
- Brain death assessment

Unit III — Intraoperative Neurophysiological Monitoring (9 HOURS)

- Somatosensory evoked potentials
- Motor evoked potentials
- Cranial nerve monitoring
- Spinal cord monitoring

Unit IV — Monitoring in Critical Care (9 HOURS)

- Intracranial pressure monitoring
- Cerebral blood flow monitoring
- Sleep monitoring and polysomnography
- Neuromuscular monitoring

Unit V — Clinical Interpretation and Applications (9 HOURS)

- Monitoring during neurosurgery
- Monitoring in stroke and trauma
- Pediatric neurophysiological monitoring
- Emerging technologies and trends

Reference Books

1. Intraoperative Neurophysiological Monitoring

MALLA REDDY VISHWAVIDYAPEETH (Deemed to be University)

2. Current Practice of Clinical Electroencephalography
3. Atlas of EEG in Critical Care
4. Clinical Neurophysiology

COGNITIVE NEUROSCIENCE (45 HOURS) L/T/P/C 3/-/-/3

Learning Objectives

- To understand neural mechanisms underlying cognition and behavior.
- To study brain functions related to memory, language, and perception.
- To integrate neuroscience with psychology and cognition.

Learning Outcomes

After completion, the student will be able to:

- Explain neural basis of cognitive functions and behavior.
- Describe brain regions associated with memory, language, attention, and executive functions.
- Correlate cognitive dysfunctions with neurological and psychiatric disorders.
- Interpret basic cognitive assessment findings.

Unit I — Introduction to Cognitive Neuroscience (9 HOURS)

- History and scope
- Brain-behaviour relationship
- Methods in cognitive neuroscience
- Functional localization

Unit II — Attention and Perception (9 HOURS)

- Visual perception
- Auditory perception
- Selective attention
- Neural basis of consciousness

Unit III — Learning and Memory (9 HOURS)

- Types of memory
- Memory systems
- Hippocampus and memory circuits
- Neural plasticity

Unit IV — Language and Executive Functions (9 HOURS)

- Neural basis of language
- Speech and language disorders
- Decision-making

- Problem-solving and executive control

Unit V — Emotion and Social Cognition (9 HOURS)

- Limbic system
- Emotion regulation
- Motivation and reward pathways
- Social cognition and behavior
- Cognitive disorders

Reference Books

1. Cognitive Neuroscience: The Biology of the Mind
2. Principles of Neural Science
3. The Student's Guide to Cognitive Neuroscience
4. Fundamental Neuroscience

PRACTICAL: NEUROIMAGING TECHNIQUES (30 HOURS)

L/T/P/C

-/-/4/2

Learning Objectives

- To provide hands-on exposure to basic and advanced neuroimaging modalities.
- To train students in identification and interpretation of brain imaging.
- To develop understanding of imaging protocols used in neurological diagnosis.
- To correlate imaging findings with clinical neuroscience.

Learning Outcomes

After completion, the student will be able to:

- Assist in patient preparation for neuroimaging procedures.
- Identify basic neuroanatomical structures in CT and MRI scans.
- Demonstrate safe handling of imaging equipment and protocols.

1. Introduction to Neuroimaging Lab & Safety Protocols

- Radiology lab orientation
- MRI/CT safety guidelines
- Contrast agent safety and precautions

2. Identification of Brain Anatomy on CT Scan

- Normal CT brain anatomy
- Ventricles, sulci, and major structures
- Midline shift identification

3. CT Brain Interpretation in Stroke

- Ischemic stroke patterns
- Hemorrhagic stroke identification
- Early infarct signs

4. MRI Brain Anatomy (T1, T2, FLAIR)

- Sequence differentiation
- Gray matter vs white matter identification
- Normal MRI brain labeling

5. MRI in Neurodegenerative Disorders

- Imaging features of Alzheimer's disease
- Basal ganglia changes in Parkinson's disease

6. MRI in Demyelinating Disorders

- Identification of lesions in Multiple sclerosis
- White matter lesion mapping

7. Brain Tumor Imaging (CT/MRI)

- Glioma, meningioma patterns
- Contrast enhancement interpretation
- Mass effect and edema

8. Functional Neuroimaging (fMRI / PET – Demonstration)

- Functional brain mapping principles
- Activation areas during tasks
- Clinical applications in epilepsy and cognition

REFERENCE BOOKS

- MRI Made Easy
- Diagnostic Neuroradiology
- Clinical MRI
- Neuroimaging: The Essentials
- Osborn's Brain Imaging
- Guyton and Hall Textbook of Medical Physiology

CLINICAL POSTINGS 2 (90 HOURS)

L/T/P/C
-/-/12/6

Advanced Neurodiagnostic & Cognitive Neuroscience

Learning Objectives

- To integrate neuroimaging, electrophysiology, and cognitive neuroscience in clinical practice.
- To develop interpretation skills in multimodal neurodiagnostic data.
- To provide exposure to advanced neurophysiological monitoring systems.
- To train students in clinical reasoning and brain-behavior correlation.

Learning Outcomes

After completion, the student will be able to:

- Observe and assist in advanced neurodiagnostic procedures and cognitive assessments.
- Correlate clinical findings with neurodiagnostic and cognitive data.
- Demonstrate professional conduct in patient care and clinical environments.
- Participate in case discussions and interdisciplinary clinical activities.

Posting Units / Departments

Students will rotate through:

- Neuroimaging Department (CT/MRI/PET)
- Neurophysiology Laboratory (EEG/EMG/NCS)
- Neurophysiological Monitoring Unit (ICU & OR)
- Cognitive Neuroscience & Psychology Lab
- Neurology OPD & Ward
- Neurocritical Care Unit

SEMESTER -III

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	Max. Marks		
							INT	EXT	TOTAL
1		Neurological Disorders and Treatments	4			4	40	60	100
2		Clinical Neurophysiology	4			4	40	60	100
3		Rehabilitation in Neuroscience	3			3	40	60	100
4		Advanced EEG and EMG Techniques	3			3	40	60	100
5		Practical: Clinical Neurophysiology			4	2	40	60	100
6		Clinical postings 3			12	6	40	60	100
TOTAL			14		16	22	240	360	600

NEUROLOGICAL DISORDERS AND TREATMENTS (60 HOURS)

L/T/P/C
4/-/-/4

Learning Objectives

- To understand major neurological disorders and their pathophysiology.
- To study diagnostic approaches and therapeutic interventions.
- To correlate clinical symptoms with neural dysfunction.

Learning Outcomes

After completion, the student will be able to:

- Describe causes, symptoms, and progression of major neurological disorders.
- Explain diagnostic procedures used in neurological practice.
- Discuss medical, surgical, and rehabilitative treatment approaches for neurological diseases.

Unit I — Introduction to Neurological Disorders (12 HOURS)

- Classification of neurological disorders
- Clinical manifestations and neurological examination
- Etiology and risk factors
- Principles of neurological diagnosis

Unit II — Neurodegenerative and Movement Disorders (12 HOURS)

- Parkinson's disease
- Alzheimer's disease
- Huntington's disease
- Amyotrophic lateral sclerosis (ALS)
- Movement disorders and tremors

Unit III — Cerebrovascular and Demyelinating Disorders (12 HOURS)

- Stroke
- Transient ischemic attacks
- Multiple sclerosis
- Spinal cord disorders
- Neurovascular emergencies

Unit IV — Epilepsy and Neuromuscular Disorders (12 HOURS)

- Epilepsy
- Seizure classification
- Peripheral neuropathies
- Myasthenia gravis
- Muscular dystrophies

Unit V — Treatments and Emerging Therapies (12 HOURS)

- Pharmacological management
- Neurosurgical interventions
- Deep brain stimulation
- Neurorehabilitation approaches
- Stem cell therapy and future directions

Reference Books

1. Adams and Victor's Principles of Neurology
2. Bradley's Neurology in Clinical Practice
3. Merritt's Neurology

4. Neurology and Neurosurgery Illustrated

CLINICAL NEUROPHYSIOLOGY (60 HOURS)

L/T/P/C
4/-/-/4

Learning Objectives

- To understand clinical applications of neurophysiological techniques.
- To interpret neurophysiological findings in neurological disorders.
- To integrate electrophysiological methods into clinical practice.

Learning Outcomes

After completion, the student will be able to:

- Explain principles and applications of clinical neurophysiology.
- Describe techniques such as EEG, EMG, NCV, and evoked potentials.
- Interpret basic neurophysiological recordings and findings.

Unit I — Basics of Clinical Neurophysiology (12 HOURS)

- Principles of clinical neurophysiology
- Electrophysiological instrumentation
- Signal acquisition and analysis
- Safety and ethics

Unit II — Electroencephalography (EEG) (12 HOURS)

- EEG waveforms and interpretation
- EEG in epilepsy
- EEG in encephalopathy and coma
- Sleep EEG and polysomnography

Unit III — Electromyography and Nerve Conduction (12 HOURS)

- Motor and sensory nerve conduction studies
- Needle electromyography
- Neuromuscular junction testing
- Interpretation of abnormalities

Unit IV — Evoked Potentials (12 HOURS)

- Visual evoked potentials
- Brainstem auditory evoked potentials
- Somatosensory evoked potentials
- Clinical applications

Unit V — Clinical Applications (12 HOURS)

- Neurophysiology in ICU
- Intraoperative monitoring
- Neurophysiology in movement disorders
- Pediatric clinical neurophysiology
- Emerging neurophysiological technologies

Reference Books

1. Current Practice of Clinical Electroencephalography
2. Electromyography and Neuromuscular Disorders
3. Clinical Neurophysiology

4. Atlas of EEG in Critical Care

REHABILITATION IN NEUROSCIENCE (45 HOURS)

L/T/P/C
3/-/-/3

Learning Objectives

- To understand principles and strategies of neurorehabilitation.
- To study rehabilitation approaches for neurological disorders.
- To develop interdisciplinary perspectives in patient care.

Learning Outcomes

After completion, the student will be able to:

- Explain principles and goals of neurological rehabilitation.
- Identify rehabilitation techniques used for motor, sensory, cognitive, and speech impairments.
- Describe roles of multidisciplinary rehabilitation teams.
- Assist in planning basic rehabilitation programs for neurological patients.

Unit I — Introduction to Neurorehabilitation (9 HOURS)

- Principles of rehabilitation
- Neuroplasticity and recovery
- Multidisciplinary rehabilitation team
- Functional assessment methods

Unit II — Rehabilitation in Stroke and Brain Injury (9 HOURS)

- Stroke rehabilitation
- Traumatic brain injury rehabilitation
- Cognitive rehabilitation
- Motor rehabilitation techniques

Unit III — Rehabilitation in Neurodegenerative Disorders (9 HOURS)

- Rehabilitation in Parkinson's disease
- Rehabilitation in Alzheimer's disease
- Multiple sclerosis rehabilitation
- Assistive technologies

Unit IV — Pediatric and Spinal Rehabilitation (9 HOURS)

- Cerebral palsy rehabilitation
- Spinal cord injury rehabilitation
- Speech and language therapy
- Occupational therapy approaches

Unit V — Advanced Rehabilitation Techniques (9 HOURS)

- Robotics in rehabilitation
- Brain-computer interfaces
- Virtual reality therapy
- Neuroprosthetics
- Community-based rehabilitation

Reference Books

1. Neurological Rehabilitation
2. Physical Rehabilitation
3. Stroke Rehabilitation
4. Principles of Neural Science

ADVANCED EEG AND EMG TECHNIQUES(45 HOURS) L/T/P/C 3/-/-/3

Learning Objectives

- To develop advanced knowledge of EEG and EMG techniques.
- To understand interpretation of complex electrophysiological findings.
- To apply advanced neurodiagnostic procedures in clinical practice.

Learning Outcomes

After completion, the student will be able to:

- Describe advanced EEG and EMG techniques and instrumentation.
- Perform electrode placement and calibration according to standard protocols.
- Identify artifacts and troubleshoot technical recording problems.
- Recognize abnormal EEG and EMG patterns associated with neurological disorders

Unit I — Advanced EEG Techniques (9 HOURS)

- Digital EEG systems
- Quantitative EEG
- Video EEG monitoring
- EEG artifact analysis
- EEG in epilepsy surgery

Unit II — Advanced EMG Techniques(9 HOURS)

- Quantitative EMG
- Single fiber EMG
- Repetitive nerve stimulation
- Motor unit analysis

Unit III — Advanced Nerve Conduction Studies(9 HOURS)

- Specialized nerve conduction techniques
- Blink reflex studies
- H-reflex and F-wave studies
- Autonomic nervous system testing

Unit IV — Evoked Potential Techniques(9 HOURS)

- Advanced visual evoked potentials
- Cognitive evoked potentials
- Event-related potentials
- Multimodal monitoring

Unit V — Clinical Interpretation and Applications(9 HOURS)

- EEG and EMG case interpretation
- Neurodiagnostics in neuromuscular disorders
- ICU neurophysiology
- Emerging trends in electrophysiology

Reference Books

1. Current Practice of Clinical Electroencephalography
2. Electromyography and Neuromuscular Disorders
3. Electrodiagnosis in Diseases of Nerve and Muscle
4. Clinical Neurophysiology

PRACTICAL: CLINICAL NEUROPHYSIOLOGY (30 HOURS)

L/T/P/C
-/-/4/2

Learning Objectives

- To provide practical training in neurophysiological procedures and recordings.
- To develop technical competency in handling neurophysiology equipment.
- To strengthen clinical observation and data interpretation skills.
- To ensure adherence to patient safety and ethical practices.

Learning Outcomes

After completion, the student will be able to:

- Perform basic clinical neurophysiology setup procedures.
- Record and document EEG, EMG, and nerve conduction studies under supervision.
- Apply infection control and patient safety protocols during procedures.
- Identify normal and abnormal neurophysiological patterns.

1. Advanced EEG Machine Setup and Calibration

- Digital EEG system setup
- Electrode impedance checking
- Calibration and signal quality optimization

2. Routine EEG Recording and Interpretation

- Standard EEG recording protocol
- Identification of normal EEG patterns
- Basic report writing

3. EEG in Sleep Studies

- Sleep stage identification
- REM and non-REM patterns
- Sleep EEG recording basics

4. Video EEG Monitoring

- Setup of video EEG system
- Seizure event recording
- Correlation of clinical and EEG events

5. Quantitative EEG (QEEG) Analysis

- Frequency analysis
- Power spectrum interpretation
- Basic brain mapping

6. Motor and Sensory Nerve Conduction Studies (Advanced)

- Advanced electrode placement

- Calculation of conduction velocity
- Interpretation of neuropathy patterns

7. Needle Electromyography (EMG)
- Needle insertion techniques (demonstration)
- Motor unit potential analysis
- Myopathy vs neuropathy differentiation

8. Repetitive Nerve Stimulation and Neuromuscular Junction Testing
- Protocol for repetitive stimulation
- Fatigue and decremental response
- Myasthenia gravis pattern identification

9. Evoked Potentials (Advanced)
- Visual Evoked Potentials (VEP)
- Brainstem Auditory Evoked Potentials (BAEP)
- Somatosensory Evoked Potentials (SSEP)
- Latency interpretation

REFERENCE BOOKS
- Current Practice of Clinical Electroencephalography
- Electromyography and Neuromuscular Disorders
- Electrodiagnosis in Diseases of Nerve and Muscle
- Clinical Neurophysiology
- Atlas of EEG in Critical Care

MALLA REDDY VISHWAVIDYAPEETH (Deemed to be University)

CLINICAL POSTINGS 3 (90 HOURS)

L/T/P/C
-/-/12/6

Advanced Clinical Neurophysiology & Neurorehabilitation

Learning Objectives
- To integrate clinical neurology, neurophysiology, and rehabilitation practices.
- To develop advanced skills in EEG/EMG interpretation and neurological assessment.
- To provide exposure to management of neurological disorders and rehabilitation planning.
- To train students in clinical decision-making and patient-centered neuroscience care.

Learning Outcomes

After completion, the student will be able to:
- Observe and assist in advanced neurophysiological diagnostic procedures.
- Participate in neurorehabilitation assessments and therapeutic sessions.
- Correlate clinical findings with neurophysiological and rehabilitation data.
- Demonstrate professional behaviour and effective patient interaction.

Posting Units / Departments

Students will rotate through:

- Neurology OPD & Ward
- Neurophysiology Laboratory (EEG/EMG/NCS)
- Advanced EEG Laboratory (Video EEG / QEEG)
- Rehabilitation Medicine Unit
- Physiotherapy & Occupational Therapy Unit
- Neurosurgery Unit
- Neurocritical Care Unit (ICU)

SEMESTER IV

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	Max. Marks		
							INT	EXT	TOTAL
1		Neurocritical Care	3			3	40	60	100
2		Neuroinformatics	3			3	40	60	100
3		Research Methodology and Biostatistics	3			3	40	60	100
4		Thesis/Research Project			12	6	40	60	100
5		Practical: Neurocritical Monitoring Techniques			4	2	40	60	100
6		Clinical posting 4			10	5	40	60	100
TOTAL			9		26	22	240	360	600

NEUROCRITICAL CARE(45 HOURS)

L/T/P/C
3/-/-/3

Learning Objectives

- To understand principles and management of neurological emergencies.
- To study monitoring and supportive care in critically ill neurological patients.

- To develop knowledge of intensive neurocare practices.

Learning Outcomes

After completion, the student will be able to:

- Describe common neurological emergencies and their management.
- Explain principles of neurocritical monitoring and life-support systems.
- Identify complications associated with critically ill neurological patients.
-

Unit I — Introduction to Neurocritical Care(9 HOURS)

- Organization of neurocritical care units
- Neurological assessment in ICU
- Glasgow Coma Scale
- Airway, ventilation, and hemodynamic support
- Ethical considerations in neurocritical care

Unit II — Cerebrovascular Emergencies(9 HOURS)

- Acute ischemic stroke
- Hemorrhagic stroke
- Subarachnoid hemorrhage
- Intracranial pressure management
- Neuroimaging in emergencies

Unit III — Seizures and Neuromuscular Emergencies(9 HOURS)

- Status epilepticus
- Neuromuscular respiratory failure
- Guillain–Barré syndrome
- Myasthenic crisis
- Emergency neuropharmacology

Unit IV — Traumatic and Infectious Neurological Disorders (9 HOURS)

- Traumatic brain injury
- Spinal cord trauma
- CNS infections
- Meningitis and encephalitis
- Brain death assessment

Unit V — Monitoring and Advanced Care (9 HOURS)

- Continuous EEG monitoring
- Intracranial pressure monitoring
- Mechanical ventilation in neuro ICU
- Neurocritical rehabilitation
- Emerging technologies in neurocritical care

Reference Books

1. Neurocritical Care
2. Textbook of Neurointensive Care
3. Critical Care Neurology and Neurosurgery
4. Principles of Neural Science

MALLA REDDY VISHWAVIDYAPEETH (Deemed to be University)

NEUROINFORMATICS (45 HOURS)

L/T/P/C
3/-/-/3

Learning Objectives

- To introduce computational approaches in neuroscience.
- To understand management and analysis of neuroscience data.
- To develop knowledge of neuroinformatics tools and applications.

Learning Outcomes

After completion, the student will be able to:

- Explain principles and applications of neuroinformatics.
- Describe methods of neurological data acquisition, storage, and analysis.
- Use basic software tools for neurodata interpretation and presentation.
- Interpret digital neurophysiological and neuroimaging datasets.

Unit I — Introduction to Neuroinformatics (9 HOURS)

- Concepts and scope
- Neuroscience databases
- Data acquisition and storage
- Brain mapping initiatives

Unit II — Computational Neuroscience Basics (9 HOURS)

- Neural networks
- Computational models of neurons
- Signal processing concepts
- Brain connectivity analysis

Unit III — Neuroimaging Data Analysis (9 HOURS)

- MRI and fMRI data processing
- EEG signal analysis
- Image segmentation
- Statistical mapping techniques

Unit IV — Artificial Intelligence in Neuroscience (9 HOURS)

- Machine learning concepts
- Deep learning in neuroimaging
- Brain-computer interfaces
- Predictive analytics in neurological disorders

Unit V — Applications and Emerging Trends (9 HOURS)

- Neuroinformatics in precision medicine
- Big data in neuroscience
- Neuroinformatics ethics
- Cloud computing and data sharing
- Future directions in neuroinformatics

Reference Books

1. Principles of Neural Science
2. Theoretical Neuroscience
3. Neuroinformatics
4. Pattern Recognition and Machine Learning

RESEARCH METHODOLOGY AND BIOSTATISTICS(45 HOURS)
L/T/P/C

3/-/-/3

Learning Objectives

- To understand principles of scientific research and experimental design.
- To develop skills in data collection, statistical analysis, and interpretation.
- To prepare students for independent neuroscience research.

Learning Outcomes

After completion, the student will be able to:

- Describe different types of research designs and methodologies.
- Formulate research questions, objectives, and hypotheses.
- Apply basic biostatistical methods for data analysis.
- Interpret statistical results and research findings

Unit I — Introduction to Research Methodology (9 HOURS)

- Scientific methods and research process
- Types of research designs
- Literature review and hypothesis formulation
- Research ethics and plagiarism

Unit II — Sampling and Data Collection (9 HOURS)

- Sampling techniques
- Data collection methods
- Questionnaire design
- Clinical and laboratory research methods

Unit III — Descriptive and Inferential Statistics (9 HOURS)

- Measures of central tendency and dispersion
- Probability distributions
- Hypothesis testing
- Parametric and non-parametric tests

Unit IV — Statistical Analysis and Software (9 HOURS)

- Correlation and regression
- Analysis of variance (ANOVA)
- Statistical software applications
- Data presentation and interpretation

Unit V — Scientific Writing and Research Presentation (9 HOURS)

- Writing research proposals
- Thesis and dissertation preparation
- Scientific manuscript writing
- Presentation skills and publication ethics

Reference Books

1. Research Methodology: Methods and Techniques
2. Biostatistics
3. Fundamentals of Biostatistics
4. Practical Statistics for Medical Research
5.

PRACTICAL 4

Neurocritical Monitoring Techniques (30HOURS) **L/T/P/C -/-/4/2**

Learning Objectives

- To provide hands-on training in neurocritical monitoring procedures.
- To develop technical skills in handling critical care monitoring equipment.
- To enhance understanding of patient monitoring in neurological emergencies.
- To ensure safe and effective monitoring practices in ICU settings.

Learning Outcomes

After completion, the student will be able to:

- Assist in setup and operation of neurocritical monitoring equipment.
- Monitor and record neurological and physiological parameters accurately.
- Identify abnormal monitoring findings requiring immediate attention.

1. Neurocritical Care Unit Orientation and Monitoring Setup
   - ICU workflow and monitoring systems
   - Patient safety protocols
   - Setup of neuro-monitoring equipment

2. Glasgow Coma Scale (GCS) and Neurological Scoring Systems
   - GCS assessment in clinical patients
   - Pupillary reflex examination
   - NIH Stroke Scale (basic demonstration)

3. Intracranial Pressure (ICP) Monitoring Basics (Simulation/Observation)
   - ICP monitoring systems overview
   - Waveform interpretation basics
   - Clinical correlation with raised ICP

4. Continuous EEG (cEEG) Monitoring
   - Setup of long-term EEG monitoring
   - Detection of subclinical seizures
   - ICU EEG interpretation

5. Status Epilepticus Monitoring and Management Observation
   - EEG patterns in status epilepticus
   - Drug response monitoring
   - Emergency neuropharmacology observation

6. Mechanical Ventilation in Neuro ICU (Observation)
   - Ventilator modes basics
   - Neurogenic respiratory failure cases
   - Oxygenation and CO_2 monitoring

7. Hemodynamic and Cerebral Perfusion Monitoring

- Blood pressure and MAP monitoring
- Cerebral perfusion pressure concepts
- Monitoring in stroke/TBI patients

8. Brain Death Assessment Protocol
- Clinical criteria for brain death
- Reflex testing
- Apnea test observation

9. Evoked Potential Monitoring in ICU/OR
- SSEP/MEP monitoring basics
- Intraoperative neurophysiology observation
- Spinal cord monitoring principles

10. Case-Based Neurocritical Monitoring Interpretation
- ICU case review (stroke, trauma, coma)
- EEG + clinical correlation
- Documentation and reporting
-

REFERENCE BOOKS
- Neurocritical Care
- Textbook of Neurointensive Care
- Critical Care Neurology and Neurosurgery
- Current Practice of Clinical Electroencephalography
- Atlas of EEG in Critical Care
- Intraoperative Neurophysiological Monitoring
- Principles of Neural Science

MALLA REDDY VISHWAVIDYAPEETH (Deemed to be University)

CLINICAL POSTING 4 (75 HOURS)

L/T/P/C
-/-/10/5

Neurocritical Care, Neuroinformatics

Learning Objectives
- To provide exposure to neurocritical care patient management and monitoring systems.
- To develop skills in neuroinformatics tools and data analysis.
- To train students in research design, biostatistics, and scientific writing.
- To integrate clinical neuroscience with computational and research approaches.

Learning Outcomes

After completion, the student will be able to:
- Demonstrate practical skills in neurocritical monitoring, neuroimaging analysis, EEG monitoring, and neuroscience laboratory procedures under supervision.
- Correlate clinical findings, neurodiagnostic data, and research methodologies in patient care and neuroscience practice.
- Apply professional ethics, teamwork, patient safety, documentation, and data management practices in clinical and research environments.

Posting Units / Departments

Students will rotate through:

- Neurocritical Care Unit (ICU)
- Neurology Ward & Emergency Unit
- Neuroimaging & Data Analysis Lab
- Neuroinformatics / Computational Neuroscience Lab
- Research Methodology & Biostatistics Lab
- EEG Monitoring Unit (ICU-based)
- Clinical Research Department

THESIS / RESEARCH PROJECT (90 HOURS)

L/T/P/C
-/-/12/6

Learning Objectives

1. To identify a clear research problem and formulate objectives/hypothesis.
2. To develop skills in literature review and research design.
3. To apply appropriate research methods and tools for data collection.
4. To gain hands-on experience in data analysis and interpretation.
5. To understand ethical practices in research work.
6. To improve scientific writing and presentation skills.

MALLA REDDY VISHWAVIDYAPEETH (Deemed to be University)

Learning Outcomes

1. Ability to independently conduct a structured research study.
2. Competence in collecting, analyzing, and interpreting data.
3. Skill in drawing valid conclusions based on evidence.
4. Proficiency in writing a research thesis/report.
5. Ability to present and defend research findings clearly.