

**INTRODUCTION TO NEUROSCIENCE  
FOUR CREDIT COURSE**

**Course No.: S.CHE.5AC  
Total Lectures 60**

**Learning Objectives:**

This course presents current topics in the broad field of neuroscience and is geared to upper level undergraduate students. The course focuses mostly on mammalian and human brains and resembles in content some of what is taught to most medical students. Topics covered include historical foundations of neuroscience, synaptic and neurotransmitter systems, sensory and motor systems, neurocellular anatomy, motivation, mental illness, and cognitive neuroscience topics. In addition to the lectures in class students will be provided with material for a Study Pack.

**UNIT I**

**15 Lectures**

**1.1 Central Nervous System**

1.1.1 Course content, expectations and examinations; Basic Organization of the CNS

1.1.2 Autonomic Nervous Systems

1.1.3 Diffuse Modular Systems

1.1.4 Neurons and Glia; Neuronal Membrane

1.1.5 Action Potential

**1.2 CNS Drugs**

1.2.1 Classification based on pharmacological actions

1.2.2 Anxiolytics: Barbiturates (Phenobarbitone), Benzodiazepines (Alprazolam)

1.2.3 Anticonvulsants and Antiepileptics : Oxazolidinediones (Trimethadione),  
Hydantoins (Phenytoin)

1.2.4 Antischizophrenics: Phenothiazines (Chlorpromazine)

1.2.5 Antidepressants: Imipramine , Fluoxetine

**UNIT II**

**15 Lectures**

**2.1 Working of the CNS**

2.1.1 Synaptic Transmission: Chemical and Electrical

2.1.2 Neurotransmitter Systems

2.1.3 Chemical Control of the Brain

2.1.4 Neurocortical activation during decision making; Free will?

2.1.5 Addictions

**2.2 Cognition**

2.2.1 Phantom Syndrome and Pain

2.2.2 Motivation

2.2.3 Consciousness

2.2.4 Perception and Attention

**UNIT III**

**15 Lectures**

**3.1 Sensory systems and Processes**

- 3.1.1 Visual System
- 3.1.2 Auditory System
- 3.1.3 Somato Sensory System
- 3.1.4 Emotions and Mood

**3.2 Motor Systems**

- 3.2.1 Spinal Control of Movement
- 3.2.2 Alpha Motor Neurons
- 3.2.3 Gamma Motor Neurons
- 3.2.4 Cortical Control of Movement
- 3.2.5 Planning of Movement by the Cerebral Cortex

**UNIT IV**

**15 Lectures**

**4.1 Memory Systems**

- 4.1.1 Memory Systems
- 4.1.2 How we learn and Study
- 4.1.3 Sleep Patterns
- 4.1.4 Stress and De-stress

**4.2 Neuro-diseases and Everyday Life**

- 4.2.1 Neuro diseases of Aging
- 4.2.2 Brain fitness to delay aging
- 4.2.3 Genes or Environment?
- 4.2.4 Brain waves and Meditation
- 4.2.5 Sex and the Brain

**Reference Book:** Mark F. Bear, Barry W. Connors, Michael A. Paradiso, *Introduction to Neuroscience*

**Examinations:** We follow the Bloomberg System of testing knowledge, understanding and application in equal proportion.

**CIA I:** 20 Marks Maximum- Consists of questions which are multiple choice, matching, true/false, short answer, labeling brain structures.

**CIA II:** 20 Marks Maximum- Group Research Assignment + Class Assignments

**End Semester Paper Pattern:**

Total marks: 60 Marks Maximum. Time: 2 hours Total no. of questions: 10 (out of 12) of 6 marks each Questions may be set out of 9 marks [50 % internal choice]

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## Neuroscience Practical

## Course S.CHE.5.AC.PR.

### SEMESTER V

#### Learning Outcomes

The experiments for this Practical Course are made up of a set of demonstrations of classic and contemporary experiments and concepts from the neurosciences. These experiments will allow the students to experience at first hand a variety of important experimental studies, which will help them understand the design of the study, the data, and the significance of the research. Besides the content material that students will assimilate it is expected that the practical work will develop in them a keen sense of research methodology as well as incite them to do further reading in the area. It is my hope that, though not a requirement, some of the more interested students would also go on to design other similar experiments, thus giving them a real entry into the world of cognition and neuroscience.

#### Methodology

The students are expected to read the background theory. After listening to the instructions they will perform the experiment, note down the data, and then proceed to analyze the data. Results, entered in the proper format have to be initialed by the faculty member supervising the experiment.

#### ATTENTION

Expt 1: Attentional Blink

Expt 2: Change Detection

#### PERCEPTION

Expt 3: Apparent Motion

Expt 4: Garner Interference

#### NEUROCOGNITION

Expt 5: Brain Asymmetry

Expt 6: Blind Spot

#### SENSORY MEMORY

Expt 7: Metacontrast Masking

Expt 8: Modality Effect

#### SHORT-TERM MEMORY

Expt 9: Brown-Peterson

Expt 10: Position Error

#### WORKING MEMORY

Expt 11: Irrelevant Speech Effect

Expt 12: Memory Span

**Examination:** There will be 13 marks for class participation, 12 marks for successful completion of the assignment at the end of each experiment and one end semester research paper of 25 marks which will also include a presentation.

**Reference:** Francis, Greg, Ian Neath, Daniel VanHorn, *Coglab*, Wadsworth, 2008.

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