

**Course Code: APSY-364**  
**Course Title: Biological Basis of Behavior**

**Credit Hours: 3**  
**(Foundation Course)**

### **Introduction**

Biological Basis of Behavior is an advanced course in psychology that concerns with the relationship between the nervous system and behaviour. The goal of this course is to describe how psychological functioning is implemented in the nervous system. In this course, students will gain basic knowledge of the nervous system, be able to map psychological experience of both basic and complex behaviour underlying brain structure and neurotransmission, learn how the brain relies on chemicals and how subtle imbalance can result in psychiatric illness.

### **Course Objectives**

1. This course will cover the underlying biological basis of human behavior including brain and glands.
2. It is designed to be an introductory course focusing on the relationship between the nervous system, structure and function of brain, glandular system and human behavior as well as implications of glands and nervous system in psychiatric disorders.

### **Learning Outcomes**

It is expected that after completion of this course:

1. The student will possess a good understanding of structure and function of brain, different parts of nervous system, neurochemistry, hormones.
2. The students will be able to understand the link between biological factors underlying human behavior and disorders.
3. It is designed to be an introductory course focusing on the relationship between the nervous system and behavior.

### **Contents**

#### **Unit-I**

##### **1.1 Introduction**

- 1.1.1 Brief historical background, Current trends in the field of Behavioral neuroscience
- 1.1.2 Contribution of various areas and related disciplines

#### **Unit-II**

##### **2.1 Structure and Function of Nervous System**

- 2.1.1 Neurons and Glial cells: The neuron: neuronal characteristics, types, transmission and communication systems; Neuro anatomical directional terms and planes of reference
- 2.1.2 Structures of Nervous System, their functions and connections

#### **Unit-III**

##### **3.1 Methods of studying the nervous system**

- 3.1.1 Neurophysiological and Behavioral research methods of biopsychology

#### **Unit-IV**

##### **4.1 Glands**

- 4.1.1 Endocrine glands: type, functions and effects of hormones as produced by various glands in human body

## **Unit-V**

### **5.1 The central nervous system**

- 5.1.1 Fore brain, mid brain, hind brain; Spinal cord, peripheral nervous system; Autonomic nervous system

## **Unit-VI**

### **6.1 Brain Damage & Neurological Disorders**

Causes of brain damage: CVA, Head injury, Infections; Psychological implications of brain damage; Cerebrovascular Disorders, Tumors; Parkinson, Alzheimer, dementia, Epilepsy, Cerebral Palsy, Multiple Sclerosis etc. Chromosomal abnormalities; Psychiatric disorders with organic/ biochemical etiology: Mood Disorder, Anxiety Disorders, and Schizophrenia, Mental Retardation.

## **Unit-VII**

### **7.1 Neurochemistry**

- 7.1.1 Characteristics of neurotransmitters, neuromodulators and neuro-Hormones; Major neurotransmitters; Dopamine; Nor epinephrine; Serotonin; Acetylcholine; GABA
- 7.1.2 Glycine; Peptides (opiates); Introduction to Psychopharmacology

## **Unit-VIII**

### **8.1 Brain and Behaviour**

## **Unit-IX**

### **9.1 Motivation and Emotions**

- 9.1.1 Homeostasis; Involvement of brain and neurotransmitters in motivational behavior Aggression; Sleep and circadian rhythms (types and basic function); Injestic behaviors: eating and drinking.
- 9.1.2 **Emotions:** Hormonal changes in emotion; Involvement of brain regions and neurotransmitters in emotions

## **Unit-X**

### **10.1 Learning, Memory and Amnesia**

Involvement of brain regions and neurotransmitters in learning and memory; Memory disorders (Korsakov, Alzheimer's, Parkinson diseases etc)

## **Unit-XI**

### **11.1 Neurophysiology of Speech**

Factors in the development of speech; brain regions involved in speech; Speech abnormalities and speech disorders

## **Unit-XII**

### **12.1 Neurophysiology of Addiction**

## Teaching-learning Strategies

Lectures, tutorials and semester work

## Semester Work will include Assignments, Quizzes, Presentation, Class Projects, Class participation

The learning goal through Sessional work would be to promote acquisition of factual information/ subject matter/ course content, Application of knowledge and enhancing the synthesizing and generalization capacity of the students.

## Assessment and Examinations:

Sr. No.	Elements	Details
1.	Midterm Assessment	It takes place at the mid-point of the semester.
2.	Formative Assessment	It is continuous assessment. It includes: classroom participation, attendance, assignments and presentations, homework, attitude and behaviour, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

## Suggested Readings:

### • Books

- Beatty, J. (2000). *The human brain-essentials of behavioral neuroscience*. University of California: Sage Publications, Inc.
- Beaumont, G. (1990). *Understanding Neuropsychology*, OUP.
- Carlson, N. R. (2005). *Foundation of physiological psychology* (6th ed.). UK: Allyn and Bacon.
- Greenwood. (1997). *Neuro-psychological rehabilitation*, USA: Psychology Press.
- Kalat, J. W. (2001). *Biological psychology* (7<sup>th</sup> ed.).USA: Woodsworth.
- Pinel, J. (1997). *Bio-Psychology*, 3<sup>rd</sup> Edition, Allyn& Bacon.
- Pinel, J. P. (2006). *Biopsychology* (6th ed.). UK: Allyn and Bacon.
- Smock, T. (1999). *Physiological psychology*. USA: Prentice-Hall.
- Squire, L. (1990). *Neuropsychology of Memory*, Guilford Press, USA.
- Watson, N.V. et al (2007). *Biological psychology*. (5th ed.). UK: Sinaver Associates.
- Wilson, B. (1999). *Neuropsychological rehabilitation*. UK: Oxford University Press.

### • Journal Articles / Reports

- Espay, A. J., Aybek, S., Carson, A., Edwards, M. J., Goldstein, L. H., Hallett, M., ... & Morgante, F. (2018). Current concepts in diagnosis and treatment of functional neurological disorders. *JAMA neurology*, 75(9), 1132-1141.
- Keynejad, R. C., Frodl, T., Kanaan, R., Pariante, C., Reuber, M., & Nicholson, T. R. (2019). Stress and functional neurological disorders: mechanistic insights. *Journal of Neurology, Neurosurgery & Psychiatry*, 90(7), 813-821.
- Kirkland, A. E., Sarlo, G. L., & Holton, K. F. (2018). The role of magnesium in neurological disorders. *Nutrients*, 10(6), 730.
- Liang, S., Wu, X., & Jin, F. (2018). Gut-brain psychology: rethinking psychology from the microbiota-gut-brain axis. *Frontiers in integrative neuroscience*, 12, 33.

Monje, M. (2018). Myelin plasticity and nervous system function. *Annual review of neuroscience, 41*, 61-76.

Wagner, N. J., & Waller, R. (2020). Leveraging parasympathetic nervous system activity to study risk for psychopathology: The special case of callous-unemotional traits. *Neuroscience & Biobehavioral Reviews*.