BEHAVIORAL NEUROSCIENCE (HCB-945) **Credit Hrs 3 (3-0)**

Educational Objectives

1. Behavioral neuroscience is the study of the brain mechanisms underlying behavior. This is important for understanding how the normal brain works to support cognition, emotion and sensorimotor function. This course shall help to understand how and why things go wrong in the brain in various different neurological and psychiatric disorders. This course will provide basis for understanding of the animals models which can used to study and understand behavioral neuroscience. This course shall improve the understanding of students in neuroscience and psychology and shall help students to plan their research in behavioral neurosciences and will equip students to use animals for studying various behaviors.

Course Outcomes

2. This will help students to understand molecular basis of the behaviors and will improve behavior understanding and knowing about the animal models which can be used for behaviors studies. This will also be helpful for the healthcare sector to understand and look for the treatment options for the disorders of behavior

Course Contents

3. General introduction
    a. Introduction to nervous system and behaviors
    b. Consciousness
    c. Emotional States and Feelings
    d. Learning and Memory
    e. Cellular Mechanisms of Learning and the Biological Basis of Individuality
    f. The Autonomic Nervous System and the Hypothalamus (role in behaviors)
    g. Various brain areas involved in learning, memory and emotional feelings
        (1) Hippocampus
        (2) Amygdala
        (3) Cortex
        (4) Entorhinal cortex
            Animal models and their behavior tests for various brain areas
    h. Need for the animal models in neuroscience and behaviors
    i. Different types of animal models used in neuroscience
        (1) Knockouts and transgenic

(2) Conditional control of gene expressions (optogenetics and conditional knockouts)

j. Principals of animal colony maintenance
k. Morris water maze test
l. Fear conditioning and extinction test
m. Open field test
n. Circadian rhythms measurements
o. Novel object
p. Social behavior test
q. Hole board test
r. Reward testing
s. Passive avoidance
t. Coordination balance testing
u. Drug discrimination

Recommended readings Text Books

1. **Principles of Neural Sciences**: (Eric Kandel, James Schwartz, Thomas Jessell) Third Edition 2000

2. **Methods of Behavior Analysis in Neuroscience**, 2nd edition. Editor: Jerry J Buccafusco.CRC Press/Taylor & Francis; 2009.ISBN-13: 978-1-4200-5234-3

3. **Animal Models of Cognitive Impairment**. Levin ED, Buccafusco JJ, editors. Boca Raton (FL): CRC Press/Taylor & Francis; 2006.

Reference book:

Neuroscience: (Dale Purves): Third Edition 2004

DCRC and ICRC status: Approved