SEMESTER II

CC-3: BIOPSYCHOLOGY

UNIT 1

INTRODUCTION TO BIOPSYCHOLOGY

LECTURE: 1

Why should psychologists be interested in biology?

OUTLINE:

- **What is Biopsychology?**
- **Contribution of Donald Hebb (1949, 1955) in its emergence.**
- **Brain – Behaviour Relationship: Necessary vs. Sufficient condition.**
- **Illustration.**
- **Importance of studying such relationship in psychology.**

Reference: https://sites.uni.edu/walsh/whatisbiopsych.pdf

LECTURE: 2

Fundamental Concepts of Biopsychology

OUTLINE:

- **Concept of Homeostasis.**
  - ✓Understanding homeostasis is fundamental to understanding the function of the body as a whole, as the organism undergoes change and development throughout its life (NRC,2012).
  - ✓Factors affecting homeostasis: Ex. Psychological factor affecting homeostasis.
- **Concept of Neuroplasticity.**
  - ✓The brain's capacity to alter its structure and function in reaction to environmental diversity, thus reflecting a capacity that is often referred to as brain plasticity.
  - ✓Types of Neuroplasticity.
  - ✓Influence of psychological factors in Neuroplasticity.
  - ✓Illustration.

LECTURE: 3

Nature of Biopsychology

OUTLINE:

i. Everything that is psychological is simultaneously biological.

ii. Biopsychology as a Neuroscience.

iii. Biopsychology is an integrative discipline.

iv. Biopsychology studies the Genetic influence on behaviour.

v. Biopsychological research can be either pure or applied.

vi. Biopsychological research can involve both human and nonhuman subjects.

LECTURE: 4

Ethical issues in Biopsychology

OUTLINE:

- Ethical Standards in Psychological Research (APA, 1973).
- All studies must be approved by the local ethics committee.
- A number of ethical issues are important:

  ✓ Fully explaining the procedures and likely consequences.

  ✓ Obtaining informed consent.

  ✓ Respecting participant's freedom to decline participation.

  ✓ Ensuring confidentiality of data.

  ✓ Avoiding unnecessary deception.

  ✓Protecting the participants from physical and

OUTLINE:

- ✓ Explaining any potential risk or adverse effect in advance.
- ✓ A full, accurate and appropriate debriefing at the end of session.
- ✓ Participants should not be induced financially for participation.
- ✓ A consensus must be reached on the desirability of conducting an invasive animal experiment to address a specific scientific problem

LECTURE: 5 &6

What are the divisions and scope of Biopsychology?

OUTLINE:

- Physiological Psychology
- Psychopharmacology
- Neuropsychology
- Psychophysiology
- Cognitive Neuroscience
- Comparative Psychology

Reference:
https://sites.uni.edu/walsh/whatisbiopsych.pdf

- **Physiological psychology** - neural mechanisms of behavior studied through the direct manipulation and recording of the brain in controlled experiments.
- **Psychopharmacology** – study of the manipulation of neural activity and behavior with drugs.
- **Neuropsychology -** study of the psychological effects of brain damage in human patients.
- **Psychophysiology -** studies the relation between physiological activity and psychological processes in human subjects.
- **Cognitive neuroscience** - study of the neural bases of cognition (intellectual processes such as thought, memory, attention, and complex perceptual processes)

- **Comparative psychology** - compares the behavior of different species in order to understand the evolution, genetics, and adaptiveness of behavior.
- Includes evolutionary psychology and behaviour genetics.

LECTURE: 7 & 8 - Research Methods in Biopsychology

STUDYING NERVOUS SYSTEM - 1. BRAIN-IMAGING TECHNOLOGIES

- Contrast X rays
- Computerized Tomography,
- Magnetic resonance imaging,
- FMRI,
- Magnetoencephalography,
- Positron emission tomography,
- Transcranial Magnetic Stimulation

- Purposes of using these techniques & areas of usage

2. RECORDING BRAIN ELECTRICAL ACTIVITY

- Electroencephalogram
- Magnetic Recording
- Event-Related Potentials
- Microelectrode Recording
- Patch Clamps

- Purposes of using these techniques & areas of usage

3. BRAIN STIMULATION

- Electrical stimulation
- Magnetic stimulation

- Purposes of using these techniques & areas of usage

4.NEUROCHEMICAL APPROACHES

- Chemical Stimulation
- Microiontophoresis
- Microdialysis

- Purposes of using these techniques & areas of usage

5. Brain Lesion Analysis

- Brief discussion of the methods used to create lesions
- Purposes of using these techniques & areas of usage

- **Reference**
  https://www.albany.edu/faculty/cafrye/apsy601/Ch.05ResearchMethods.html

6. Recording Psychophysiological Activity

- Muscle tension
- Eye movement
- Skin conductance
- Cardiovascular activity

7. Pharmacological Research Methods

- Measuring chemical activity of the brain
- Locating neurotransmitters and receptors in the brain
- Selective Chemical lesions

8. Genetic Engineering

- Gene Knockout Techniques
- Gene Replacement Techniques

Behavioural Research Methods Of Biopsychology

1. NEUROPSYCHOLOGICAL TESTING

- Single test approach
- Standardized test Battery approach – e.g. Halstead-Reitan Neuropsychological Test battery.
- Customized Test-Battery Approach.
- Frontal Lobe Function – eg: Wisconsin Card Sorting test

- Common & specific neuropsychological test batteries to be briefly mentioned
- Eg: Intelligence, memory, language, etc.

Biopsychological Paradigm of Animal Behaviour

1. Paradigm for Assessment of Species-Common Behaviours

- Open-Field Test
- Test of aggressive and defensive behaviour
- Tests of Sexual Behaviour

2. Traditional Conditioning Paradigms

3. Seminatural Animal Learning

- Conditioned Taste Aversion
- Radial Arm maze
- Morris Water Maze
- Conditioned Defensive burying

- All methods to be illustrate with the purposes they serve in studying different behavioural and psychological aspects of human and animal behaviour.

Readings:

- **Pinel, J.P.J: Biopsychology. 8th edition. Pearson Education. New Delhi.**

- **Carlson, N.R (2009). Foundations of Physiological Psychology. 6th edition. Pearson Education. New Delhi.**

- **Elias and Saucier (2018). Neuropsychology: Clinical and Experimental Foundations. First edition. Pearson Education. New Delhi.**