



University of Kerala

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|----------------|--|------------------|-------------------|--------------------|------------------|
| Discipline | ZOOLOGY | | | | |
| Course Code | UK1DSCZOO104 | | | | |
| Course Title | Human Nervous System and Behaviour | | | | |
| Type of Course | DSC | | | | |
| Semester | I | | | | |
| Academic Level | 100 - 199 | | | | |
| Course Details | Credit | Lecture per week | Tutorial per week | Practical per week | Total Hours/Week |
| | 4 | 4 hours | - | - | 4 |
| Pre-requisites | Pass in class XII | | | | |
| Course Summary | The course imparts basic knowledge on the role of different components of the nervous system in human behaviour. Through the course the learner shall get a comprehensive understanding of the major components of the nervous system in human behaviour and the impact of drug abuse and the physiological basis of drug addiction. | | | | |

Detailed Syllabus

| Module | Unit | Content | 60 hrs |
|-----------|--|---|-----------|
| I | Human nervous system | | 12 |
| | 1.1 | Divisions of the human nervous system: central and peripheral nervous systems- somatic and autonomic systems-sympathetic and parasympathetic systems, cranial nerves and spinal nerves | 3 |
| | 1.2 | Structure of neuron, types of neurons – myelinated and unmyelinated; unipolar, bipolar and multipolar; sensory, motor and interneurons | 3 |
| | 1.3 | Glial Cells- Schwann cells, microglia, oligodendrocytes, satellite cells, ependymal cells (brief account) | 2 |
| | 1.4. | Major structures of human brain and functions – cerebrum, cerebral cortex, stellate and pyramidal cells, thalamus, hypothalamus, limbic system and its components, midbrain, pons varolii, cerebellum Spinal cord- structure and functions | 4 |
| | Related activities: 1. Construction of a model of the human brain showing its parts. (Group Activity). 2. Prepare a flowchart of parts of brain and their functions. | | |
| II | Neurophysiology | | 12 |
| | 2.1 | Nerve impulse generation and transmission – resting membrane potential, action potential, hyperpolarization, saltatory conduction, threshold stimulus and latent period, all or none law, refractory period | 5 |
| | 2.2 | Synaptic transmission-chemical and electrical transmission, synaptic delay, synaptic fatigue | 2 |

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|------------|--|--|-----------|
| | 2.3 | Neurotransmitters – excitatory and inhibitory – acetyl choline, noradrenaline, aspartic acid, glutamic acid, serotonin, histamine, adrenalin, glycine, GABA, dopamine (brief account of their major functions) | 3 |
| | 2.4 | Reflex actions- somatic and visceral, reflex arc | 2 |
| III | Brain and behaviour | | 12 |
| | 3.1. | Cerebral lateralization and handedness, interhemispheric differences and sex differences in cerebral functions | 4 |
| | 3.2. | Language functions of cerebral cortex - Wernicke's area, Broca's area, motor cortex, Arcuate fasciculus, Wernicke- Geshwind model of language perception and production | 5 |
| | 3.3. | Brain damage and language - Wernicke's aphasia, Broca's aphasia, conduction aphasia, global aphasia, transcortical aphasia | 3 |
| | Related activity: <i>Students can conduct right and left handedness surveys in class room/campus to identify cerebral lateralization.</i> | | |
| IV | Monitoring and measuring brain activity | | 12 |
| | 4.1. | EEG (mention different types of brain waves), CT Scan, PET Scan, MRI and functional MRI, Cerebral blood flow (CBF) | 8 |
| | 4.2. | Brain lesioning and deep brain stimulation (mention stereotactic surgery), Transcranial Magnetic Stimulation | 4 |
| | Related activity: <i>Visit a medical diagnostic centre and prepare a report, including photographs, on the workings of brain monitoring devices.</i> | | |
| V | Drug addiction and brain activity | | 12 |
| | 5.1. | Drug abuse: cocaine, heroin, marijuana, LSD, MDMA (brief account) | 4 |
| | 5.2. | Drug dependence and addiction, drug tolerance, cross tolerance and withdrawal syndrome | 5 |
| | 5.3. | Drugs and reward circuits: dopamine, nucleus accumbens, prefrontal cortex and dorsal striatum | 3 |
| | Related activities: <i>1. Preparation of lists of available drugs and conducting awareness campaigns. 2. Conduct workshops/awareness street play on the impact of drug abuse and addiction. 3. Invited talks by psychologists or psychiatrists focusing on the prevention of drug abuse and personality disorder.</i> | | |

References:

1. S. Marc Breedlove, Neil Verne Watson and Mark R. Rosenzweig (2010) Biological Psychology: An introduction to behavioural, cognitive and clinical neuroscience, 6th Edition, Sinauer Associates, Incorporated Publishers.
2. Arthur C. Guyton and C.E. Hall (2010) Text Book of Medical Physiology, Elsevier Publishers.
3. Sabyasachi Sircar, (2008) Principles of Medical Physiology, 2nd Edition, Thieme Publishers.

4. James W. Kalat (2009) Biological Psychology, 10th Edition, Wadsworth
5. John P.J. Pinel, Biopsychology, Pearson International, 9th Edition
6. NCBI. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5129843/>
7. NCBI. <https://nida.nih.gov/publications/drugs-brains-behavior-science-addiction/drugs-brain>

Course Outcomes

| No. | Upon completion of the course the graduate will be able to | Cognitive Level | PSO addressed |
|------------|--|------------------------|----------------------|
| CO-1 | The study helps the students to understand the components of the human nervous system and their functions. | U | PSO-1 |
| CO-2 | Students learn the mechanism of neural co-ordination in the human body and the role of neurotransmitters. | R, U | PSO-3 |
| CO-3 | Students can apply the knowledge in analysing individual differences in human behaviour. | U, An | PSO-2 |
| CO-4 | The study could apply their knowledge in preventing drug addiction in human society. | Ap | PSO-1 |
| CO-4 | The study enables the students to identify various drugs used by drug abusers and gain awareness of the consequences of abnormal thinking. | U, Ap | PSO-1 |

R-Remember, U-Understand, Ap-Apply, An-Analyse, E-Evaluate, C-Create

Name of the Course: Human Nervous System and Behaviour
Credits: 4:0:0 (Lecture: Tutorial: Practical)

| CO No. | CO | PO/PSO | Cognitive Level | Knowledge Category | Lecture (L)/Tutorial (T) | Practical (P) |
|--------|--|------------------|-----------------|--------------------|--------------------------|---------------|
| 1 | The study helps the students to understand the components of the human nervous system and their functions. | PO1/ PSO1 | U | C | L | |
| 2 | Students learn the mechanism of neural co-ordination in the human body and the role of neurotransmitters. | PO1,PO2 /PSO3 | R,U | F,C | L | |
| 3 | Students can apply the knowledge in analysing individual differences in human behaviour. | PO1,PO3 /PSO2 | U, An | C, F | L | |
| 4 | The study could apply their knowledge in preventing drug addiction in human society. | PO1,PO2 /PSO1 | AP | F, P | L | |
| 5 | The study enables the students to identify various drugs used by drug abusers and gain awareness of the consequences of abnormal thinking. | PO1,PO2 /PSO1 | U, Ap | F, P | L | |

F-Factual, C- Conceptual, P-Procedural, M-Metacognitive

Mapping of COs with PSOs and POs:

| | PSO 1 | PSO 2 | PSO 3 | PSO4 | PS O5 | PSO 6 | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
|---------|----------|----------|----------|------|----------|----------|-----|-----|-----|-----|-----|-----|
| CO 1 | 3 | - | - | - | - | - | 3 | - | - | - | - | - |
| CO 2 | - | - | 2 | - | - | - | 3 | 2 | - | - | - | - |
| CO 3 | - | 2 | - | - | - | - | 2 | - | 2 | - | - | - |
| CO 4 | 3 | - | - | - | - | - | 3 | 2 | - | - | - | - |
| CO 5 | 2 | - | - | - | - | -- | 3 | 1 | - | - | - | - |

Correlation Levels:

| Level | Correlation |
|-------|--------------------|
| - | Nil |
| 1 | Slightly / Low |
| 2 | Moderate / Medium |
| 3 | Substantial / High |

Assessment Rubrics:

Assignment/ seminar topics

1. Labelled diagram of the human brain
2. Types of neurons
3. Different types of glial cells
4. Chemical nature of neurotransmitters
5. Age related changes in EEG
6. Natural and synthetic drugs of abuse

Continuous Comprehensive Assessment

1. Assignments
2. Seminars
3. Test
4. Model preparation

End Semester evaluation

1. Multiple choice questions
2. Very short answer questions
3. Short answer questions
4. Essay type questions

Mapping of COs to Assessment Rubrics:

| | Internal Exam | Assignment | Project Evaluation | End Semester Examinations |
|------|---------------|------------|--------------------|---------------------------|
| CO 1 | ✓ | ✓ | | ✓ |
| CO 2 | ✓ | ✓ | | ✓ |
| CO 3 | ✓ | ✓ | | ✓ |
| CO 4 | | ✓ | | ✓ |
| CO 5 | | ✓ | | |