

**HUMAN PHYSIOLOGY I**  
**(3 credits)(4 hours/week)**

**OBJECTIVES**

This course familiarizes the student of Psychology with the most essential and fundamental aspects of cell biology and basics of genetics that are essential for understanding the anatomy and physiology of the nervous system in general and of the CNS that they are to master in the following semesters.

**Module 1: Cellular organization**

- 1.1 Cell structure, plasma membrane (fluid mosaic model), and cell organelles.
- 1.2 Cell inclusions-brief description on the structure of carbohydrates, lipids and proteins.
- 1.3 Cell theory, cell principle.
- 1.4 Unicellularity to multicellularity, differentiation. Brief mention of spatial and temporal control of gene activity.
- 1.5 Tissues- brief description of major types.

**(Hours – 20)**

**Module 2: Genes and chromosomes**

- 2.1 Structure of D.N.A, D.N.A replication.
- 2.2 Concept of a gene - genetic code, introns, exons.
- 2.3 Morphology of chromosomes-size, shape, karyotype, idiogram, kinds of chromosomes.
- 2.4 Linkage and crossing over, sex linked chromosomes.

**(Hours – 14)**

**Module 3: Cell division**

- 3.1 Cell cycle.
- 3.2 Mitosis.
- 3.3 Meiosis.

**(Hours – 12)**

**Module 4: Elements of heredity and variation**

- 4.1 Mendel's work and laws of inheritance (monohybrid cross, dihybrid cross, test cross).
- 4.2 Brief explanation of terms-alleles, homozygosity, heterozygosity, genotype, phenotype.
- 4.3 Brief description of other patterns of inheritance and genotype expression-incomplete dominance, co-dominance, multiple alleles, epistasis, pleiotropy.

**(Hours – 12)**

**Module 5: Mutations and Genetic disorders**

- 5.1 Gene mutation-Kinds of mutation, classification (Somatic, gametic, point, spontaneous, induced, dominant, recessive and silent mutations).
- 5.2 Gene mutation disorders - albinism, phenylketonuria, alkaptonuria, galactosemia, brachydactyli.
- 5.3 Autosomal anomalies - Down's syndrome, Edward's syndrome, Cri du chat syndrome.
- 5.4 Sex chromosomal anomalies - Klinefelter's syndrome and Turner's syndrome.

**Hours – 14)**

**REFERENCE:**

1. Vijayakumaran Nair & Jayaprakash, Cell Biology, Genetics, Molecular Biology, Academia, Thiruvananthapuram.
2. Guptha, P.K., Cell and Molecular Biology, Rastogi Publications, Meerat.
3. Dewitt-Saunders, Biology of the cell. B.Sc. Human Physiology syllabus (CCSS) Complementary course 5
4. Strickberger W.M-Mac Millon, Genetics.
5. Gerald Karp, Cell and Molecular Biology: Concept and Experiments.
6. Roothwell, Human Genetics, Prentice Hall.
7. Lodish;Verk; et.al; Molecular Cell Biology, W.H. Freemann publishers.
8. Verma, P. S. and Agarwal, V. K., Cell Biology, Genetics, Molecular Biology, Evolution and Ecology, S. Chand and Co. New Delhi.
9. De Robertis, E. D. P. and De Robertis, E. M. F., Cell and molecular Biology, 7 th Edn, HolSaunders International Editions

## **HUMAN PHYSIOLOGY- II** **(3 credits)(4 hours/week)**

### **OBJECTIVES**

This course imparts extensive information to the Psychology student on the nervous system with special emphasis on the CNS. It also introduces the student to states of brain activities and techniques in neurophysiology.

#### **Module 1: The Nervous System**

- 1.1 Divisions (CNS,PNS – somatic and autonomic)
- 1.2 Nervous tissue (neurons, nerve fibres, nerves, synapse).
- 1.3 Non nervous tissue and other materials (neuroglia, meninges, cerebro-spinal fluid, Blood - CSF and blood - brain barriers).
- 1.4 Nerve impulse - generation, conduction, synaptic transmission, role of calcium ions, action of transmitter substances on postsynaptic neuron, types of transmitter substances.

**(Hours – 20)**

#### **Module 2: The Central Nervous System**

- 2.1 Brain – an overview (Forebrain, midbrain, hindbrain).
- 2.2 Spinal cord – an overview of its structure and organization.
- 2.3 Reflex Action – monosynaptic reflex, polysynaptic reflex, crossed extension reflex, mass reflex.

**(Hours – 14)**

#### **Module 3: The Cerebellum and the Basal Ganglia**

- 3.1 The Cerebellum and its motor functions.
- 3.2 Anatomical functions, areas of the cerebellum.
- 3.3 Function of the cerebellum in overall motor control.
- 3.4 The basal ganglia-their motor functions, role of the basal ganglia for cognitive control, functions of neurotransmitters with basal ganglia.

**(Hours – 14)**

#### **Module 4: The Cerebral Cortex**

- 4.1 Functions of the specific cortical areas –association areas (parieto occipito temporal, prefrontal and limbic association areas with special emphasis on Wernike's area and Broca's area), area for recognition of faces, concept of the dominant hemisphere.
- 4.2 Function of the brain in communication - Sensory and Motor aspects of communication.

**(Hours – 12)**

#### **Module 5: States of brain activity and Techniques in neurophysiology**

- 5.1 Sleep –Basic theories of sleep, Brain waves, Slow wave sleep and REM sleep.
- 5.2 Brain imaging – CT, MRI, PET, CBF, EEG, Lesioning and Electrical Stimulation of Brain (ESB).

**(Hours – 12)**

### **REFERENCE:**

1. Schneider A.M & Tarshis B., An introduction to Physiological Psychology, Random House, New York.
2. Guyton & Hall – Textbook of Medical Physiology, 12 th Edn., Saunders.
3. Sherwood L, Thomson, Human Physiology.
4. Kalat J.W, Wadsworth C.A, Biological Psychology.
5. Levinthal C.F, Introduction to Physiological Psychology, Prentice Hall, New Delhi.
6. K.Sembulingam and Prema Sembulingam, Essentials of Medical Physiology, Jaypee brothers Medical Publishers Pvt. Ltd.
7. Chatterjee, C.C, Human Physiology, Medical Allied Agency.

**BZL3 C04**

## **HUMAN PHYSIOLOGY-III** **(3 credits)(5 hours/week)**

### **OBJECTIVES**

This course familiarizes the student of Psychology with the sensory systems, pathways and perception of various senses. It also introduces the student to the endocrine system.

#### **Module 1: The Visual System**

- 1.1 Structure of the human eye, Organization of retina and visual pathways.
- 1.2 Functioning of the eye, visual coding, chemistry of vision, transduction in the retina, theories of color vision, visual perception.
- 1.3 Visual defects (myopia, hypermetropia, presbyopia, astigmatism, cataract, color blindness, nyktelopia). **(Hours – 18)**

#### **Module 2: Auditory System**

- 2.1 Anatomy of the auditory system.
- 2.2 Auditory pathways, auditory perception and hearing abnormalities. 2.3 Statoreceptors. **(Hours – 16)**

#### **Module 3: Gustatory and Olfactory system**

- 3.1 Anatomy of taste buds and its function, primary sensations of taste, taste thresholds and intensity discrimination, taste preferences and control of the diet.
- 3.2 Taste pathways and transmission of signals into the central nervous system.
- 3.3 Organization of the olfactory membrane, sense of smell and stimulation of the olfactory cells.
- 3.4 Categorizing smell, transmission of smell signals into the central nervous system. **(Hours – 16)**

#### **Module 4: Cutaneous senses (Somatic sensations)**

- 4.1 Classification – the mechanoreceptive somatic senses (tactile and position), the thermoreceptive senses (heat and cold), the pain sense.
- 4.2 Detection and transmission of tactile sensations – tactile receptors, detection of vibration, tickling and itch.
- 4.3 bSensory pathways for transmitting somatic signals into the central nervous system, somatosensory cortex, position senses, position sensory receptors.
- 4.4 bThermal sensations - thermal receptors, their excitation and transmission of thermal signals.
- 4.5 bPain – purpose, types, pain receptors, pain suppressive system, pain sensation. **(Hours – 20)**

#### **Module 5: Endocrine system**

- 5.1 Introduction to endocrinology, an overview of the importance of endocrine glands.
- 5.2 Mode of action of hormones and influence on growth and behavior.
- 5.3 Major endocrine glands – their location, structure, hormones produced and its role (Hypothalamus, pituitary, thyroid, adrenal, gonads, thymus, pineal body, placenta). **(Hours – 20)**

### **REFERENCE**

1. K. Sembulingam and Prema Sembulingam, Essentials of Medical Physiology, Jaypee brothers Medical Publishers Pvt. Ltd.
2. Guyton & Hall, Textbook of Medical Physiology 12 th Edn., Saunders.
3. Sebastian M.M, Animal Physiology, Madonna.
- 4 Kalat J.W, &Wadsworth C.A, Biological Psychology.
5. Barrett E. Kim, Barman M. Susan et.al; Ganong's review of Medical Physiology, Tata McGraw Hill Education Pvt. Ltd.
6. Sarada Subrhmmanian and K. MadhavanKutty, A Text Book of Physiology. Orient Longman Publication.

7. Sujith K. Chaudhari, Concise Medical Physiology, New Central Book Agency, Delhi.
8. A. K. Jain, Text Book of Physiology Vol.1 & 2, Avichal Publications.

**BZL4 C06**  
**HUMAN PHYSIOLOGY- IV**  
**(3 credits)(5 hours/week)**

**OBJECTIVES**

This course familiarizes the student of Psychology with the most essential and fundamental aspects of physiological processes underlying psychological events like hunger, thirst, sexual behaviour and emotion. It also dwells on brain damage and Neuroplasticity.

**Module 1: Physiological basis of hunger**

- 1.1 Neural control of food intake - Role of hypothalamus, Neural centers that influence Mechanical process of feeding.
- 1.2 Factors that regulate quantity of food intake, role of hormones (effect of Cholecystokinin, Peptide YY, GLP, Ghrelin).
- 1.3 Short-term regulation of food intake, intermediate and long-term effect of food intake. (Effect of blood concentrations of glucose, aminoacids, lipids on hunger and feeding), temperature regulation of food intake.
- 1.4 Obesity - causes and treatment, Eating disorders (Bulimia, Anorexia, Inanition, Cachexia, Picca).

**(Hours – 20)**

**Module 2: Physiological basis of thirst**

- 2.1 Peripheral factors in water regulation.
- 2.2 Central factors in water regulation (cellular dehydration thirst and hypovolemic thirst).

**(Hours – 14)**

**Module 3: Physiological basis of sexual behavior**

- 3.1 Hormones and sexual development – Fetal hormones and the development of reproductive organs, Sex differences in the brain, Perinatal hormones and behavioural development, Puberty: hormones and development of secondary sexual characteristics.
- 3.2 Effects of gonadal hormones on adults – Male reproduction related behavior and testosterone, Female reproduction related behavior and gonadal hormones.
- 3.3 Neural mechanisms of sexual behavior – Structural differences between the male hypothalamus and female hypothalamus, the hypothalamus and male sexual behavior, the hypothalamus and female sexual behavior.

**(Hours – 20)**

**Module 4: Neural basis of emotion**

- 4.1 Role of frontal lobes.
- 4.2 Behavioural functions of the hypothalamus and associated limbic structures, Reward centers, Rage – its association with punishment centers, placidity and tameness.
- 4.3 Functions of Amygdala.

**(Hours – 18)**

**Module 5: Brain Damage and Neuroplasticity**

5.1 Causes of brain damage – Brain tumors, Cerebrovascular disorders (Cerebral hemorrhage, Cerebral ischemia), Infections of the brain (Bacterial infections, Viral infections), Neurotoxins, Genetic factors, Apoptosis.

5.2 Neuropsychological disorders – Epilepsy (Grand Mal Epilepsy, Petit Mal Epilepsy and Focal Epilepsy), Parkinson's disease, Huntington's disease, Multiple sclerosis, Alzheimer's disease.  
**(Hours – 18)**

## **REFERENCE**

1. Schneider A.M & Tarshis B, An introduction to Physiological Psychology, Random House, New York.
2. Guyton & Hall, Saunders, Textbook of Medical Physiology.
3. Sherwood L, Thomson, Human Physiology.
4. Kalat J.W, Wadsworth C.A, Biological Psychology.
5. Levinthal C.F, Introduction to Physiological Psychology, Prentice Hall, New Delhi.
6. Pinel P.J John, Biopsychology, Pearson.
7. Neil.R.Carlson, Physiology of behavior, Pearson publishers.
8. Barrett E. Kim; Barman M. Susan et al., Ganong's Review of Medical Physiology; Tata McGraw Hill Education Pvt. Ltd.
9. Alcock John, Animal Behavior, 6 th edition, Sinauer Associates, Inc. Sunderland, Massachusetts.
10. Carlson, Neil, R., Physiology of Behavior, 8 th edition, Pearson

**FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE**  
**First semester B.Sc Degree examination, October 2019**  
**BZLI C02– Human Physiology -I**

**Max. Time: 2 hours**

**Max. mark: 60**

**SECTION A**

**I. Answer all questions, each carries 2 marks. Answer in 2 or 3 sentences. There shall be ceiling of 20 marks in this section.**

1. Cell theory
2. Genotype and phenotype
3. Albinism
4. Prophase
5. Neuron
6. Intron and exon
7. Mitochondria
8. Cell cycle
9. Amino acid
10. Monohybrid cross
11. Galactosemia
12. Silent mutation

**(Ceiling 20 marks)**

**SECTION B**

**II Answer all questions, each carries 5 marks. Answer in a paragraph of about half a page to one page. There shall be ceiling of 30 marks in this section.**

13. Describe mitosis with neatly labeled diagram.
14. Explain co-dominance and incomplete dominance.
15. Explain muscular tissues with diagram.

16. Discuss phenylketonuria and alkaptonuria.

17. Give note on carbohydrate.

18. Explain crossing over.

19. Describe 3 autosomal anomalies.

**(Ceiling 30 Marks)**

### **SECTION C**

**III Answer any one from the following, each carries 10 marks. Essay type question.**

20. Describe the process of DNA replication with appropriate diagram.

21. Explain meiosis with diagram.

**(1 x 10= 10 marks)**