SEMESTER-II

BIO-122

Introduction to Biology — Credit Hour: 3

Type: General

Course Objectives

The Course will focus on Biological foundation of Psychology. The Students will learn about basic and general concepts of biology as a prerequisite of physiological Psychology. The content will cover the similarities of biology and Psychology to better understand the biological explanation of human behavior such as cell division, genetics and chromosomal abnormality, hormonal system, role of enzymes and Immune System etc.

Course Contents

- **Basics of General Science**
  Biology as a science
  Themes in study of life
  The cellular basis of life
  Heritable information
  The correlation between structure and function
  The interaction of organisms with their environment Unity in diversity
  Evolution: the core theme
  Scientific process: the hypothetico-deductive method
- **Anatomy of the Cell**
  Basic Structure of Animal and Plant Cell
  Functions of the organelles of the Cell
  Types of human body cells: Skin cells, blood cells, tissues, organs
- **Cell Division**
  Mitosis
  Basic concepts
  Stages of Mitotic division Meiotic Division

Basic concepts

Stages of Meiosis

Similarities and Differences of Mitosis and Meosis

Control and Cell division Cycle

Cancer: Abnormality in Mitotic division

Abnormality in Meiotic division

- **Structure and Function of DNA/RNA**

  Structure of DNA

  Basic Concepts: Nucleotides, Sugar Phosphate

  Function of DNA: DNA Replication, Protein Synthesis,

  RNA a source of protein synthesis

  Types of RNA: mRNA, tRNA, rRNA.

  RNA functions: Storage of genetic information, Transfer to Ribosomes, Transcription and Translation of message for protein synthesis

  Genetic Code: Sequence Reading Frames, Start/Stop Codon

  Mutation of DNA and RNA: Effect of Mutation on Immune system, Tumors and Cancers etc.

- **Chromosomes**

  Basic Concepts: Gene, Alleles, Chromosomes-Autosomes, Sex Chromosomes, Homozygous and Heterozygous

  Dominant and Recessive Gene and Mendel‟s Law

  Alteration of chromosome structure: Deletion, Duplication, Inversion and Translocation Chromosomal disorders: Down Syndrome, Trisomy 18, Trisomy 13

  Sex Chromosome disorders: Fragile X Syndrome, Turner Syndrome, Klinefelter Syndrome, XYY, Triple XXX, Genetic imprinting

- **Genetics and Inheritance**

  Behavior Genetics: basic definition

  Genotype and Environmental Interaction

  Study Methods in Behavior Genetics: Adoption Studies, Genetic Mapping; linkage and association studies.

  Genetics of psychological characteristics /disorders: IQ and Personality development, Schizophrenia, Mood Disorders, Anxiety etc.

- **Enzymes**

  What are enzymes?

  Types of Enzymes: Metabolic, Digestive and Food Enzymes Role and benefits of enzymes

  How do enzymeswork? Inhibition of enzymes

  Factors that influence enzymes activity: Ph, Temperature, Cofactors, Coenzymes, Inhibitors and Stress

- **Hormonal Explanation of Human Behaviors**

  Basic definition and role of hormone in human body

  Protein Hormones: Pancreas and Insulin, Adrenal Gland, Thyroid Gland, Growth hormone

  Steroid Hormones: Sex Steroids; Androgens, Estrogens, Progesterone

  Hypothalamus and Hormonal system

  Pituitary Gland- A master gland

  Human Hormone disorders: Congenital Adrenal Hyperplasia (CAH), Androgen-Insensitivity Syndrome (AIS), Idiopathic Hypogonadotropic Hypogonadism (IHH), Turner‟s Syndrome, Thyroid Condition-Hyp and Hyperthroidism (Mood disturbances), Diabetes Mellitus, Acromegaly/ Gigantism, Laron‟s Syndrome.

- **Immune System**

  Basic concepts: Pathogens, Antigens, Antibodies

  Innate ImmUnity: Barrier defenses, Internal defenses:White blood cells, Inflammatory response

  Adaptive ImmUnity: Humoral response- Antibodies; Cell mediated response Immune deficiency and AutoImmune diseases

  Stress and Immune System

- **Brain and Nervous System**

  Central Nervous System (Anatomy and Functions of Brain and Spinal Cord) Peripheral Nervous System (Sympathetic-Para Sympathetic)

  Autonomic Nervous System

  Brain Areas for behavioral and emotional functions

Course Outcome

The Students will be able to understand the basic biological processes and the role of genetics in determining various abnormalities.

Recommended Books:

Cambell, N. A ., Reece, J. B., Urry, L.A., Cain, M. L., Wasserman, S. A.,

Minorsky, P.V., & Jackson, R. B. (2008). Biology (8th ed.). Indiana: Prentice Hall. Lodish, H., Berk, A., Kaiser, C. A., Krieger, M., & Scott, M. P. (2007). Molecular cellbiology (6th ed.). U.S.A: McMillan Higher Education.

Pinel, J. P. (2010). BioPsychology. (8th ed). NewYork: Allyn and Bacon.

Rani, T. V. G., & Sikar, T. T. (2005). Biology: Zoology. Text Book. India: TamilNadu text book Corporation.

Russel, P.J., Wolfe, S.L., Hertz, P.E., Starr, C., & McMillan, B. (n.a). Biology: The dynamicscience (International Student edition). U.S.A: Thomson Higher Education.