GENERIC ELECTIVES (GE-6): Introduction to Biology
Zoo-GE-6

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course
		Lecture	Tutorial	Practical/ Practice		
Introduction to Biology Zoo-GE-6	04	02	00	02	Passed 12th Class	NIL

Learning Objectives

The learning objectives of this course are as follows:

- The course is designed to acquaint students with the basic concepts of modern biology including processes in cell biology, genetics and variation, process of evolution and also the physic chemical aspects of life.
- It emphasizes on exploring different techniques, perspectives in the fields of biology from microscopy to computational biology.
- The course has been designed keeping in mind the fact that biology helps to understand ourselves and our place and role in the living world.
- It will motivate the students to pursue careers in the field of technology.

Learning Outcomes

By studying this course, students will be able to

- learn the importance of Biology in everyday life, understand the conditions and processes that led to biochemical origin of life on earth.
- compare and contrast evolutionary theory and their application to populations.
- appreciate the different cell types and cellular processes.
- know the basic structure and functioning of cell such as division, processes of information transfer from DNA to proteins.
- have an in-depth understanding of the role and importance various biomolecules like nucleic acids, proteins, lipids and carbohydrates.
- demonstrate practical knowledge of using basic laboratory instrumentation such as microscopes, micropipettes and their applications.
- learn the diverse techniques taught in practical like chromatography, biochemical test, spectrophotometric analysis and also computational biology will hone their analytical skills.

SYLLABUS OF GE-6

UNIT-1: Introduction to concepts of biology **2 hrs**

Themes in the study of biology; a closer look at ecosystem; a closer look at cell; process of science, biology and everyday life.

UNIT-2: Evolutionary history of biological diversity **4 hrs**

Early earth and the origin of life; major events in the history of life; classifying the diversity of various Kingdoms of Life.

UNIT-3: Darwinian view of life and origin of species **9 hrs**

Darwin's theory of evolution; evolution of populations (Hardy-Weinberg principle); Concepts of species; mechanism of speciation.

UNIT-4: Genetic approach to Biology **7 hrs**

Cell and organelles; cell cycle: Mitosis and meiosis; Mendel's laws and variations; model organisms for the genetic analysis.

UNIT-5: Chemical context of living systems **8 hrs**

Structure and function of biomolecules: carbohydrate, protein, lipid, and nucleic acid.

Practical **60 hrs**

(Laboratory periods: 15 classes of 4 hours each)

1. To learn use of microscope and other common instruments used in laboratory.
2. Preparation of normal, molar, and standard solutions, phosphate buffers.
3. Separation of amino acids (*any three*) by paper chromatography.
4. To perform gram staining of bacteria.
5. To prepare temporary mount of human cheek epithelial cells and to study its characteristics.
6. To perform quantitative estimation of protein using the Lowry's method.
7. To perform biochemical test and identify two functional groups of carbohydrates.
8. To retrieve sequence from database and perform Multiple Sequence Alignment.
9. Visit to a cell culture and tissue culture facility and submission of project report.

Essential/recommended readings

1. Campbell, N.A. and Reece, J. B. (2008) Biology 8th edition, Pearson Benjamin Cummings, San Francisco.
2. Raven, P. Hetal (2006) Biology 7th edition Tata McGraw Hill Publications, New Delhi

3. Karp, G. (2010). Cell & Molecular Biology: Concepts & Experiments. VI edition, John Wiley& Sons Inc.

4. De Roberties, E.D.P. & De Roberties. E.M.F. (2009). The cell & Molecular Biology, Lippincott Williams, Wilkins, Philadelphia.
5. Snustad, D.P., Simmons, M.J. (2009). Principles of Genetics. V Edition, John Wiley & Sons Inc.

Suggestive readings

1. Sheeler, P and Bianchi, D.E. (2006). Cell and Molecular Biology, 3rd edition, John Wiley & sons NY.
2. Rideley, M. (2004). Evolution. III Edition, Blackwell publishing.