Course 3: Genetics, Taxonomy and Evolution (BSCZO103)

Course Objectives:

1. To develop understanding on Systematic and the evolutionary understanding of biological phenomena.
2. To understand the International Code of Zoological Nomenclature, Its operative principals, Zoological nomenclature and formation of scientific names of various taxa.
3. To understand the molecular basis of cell structure DNA structure and functions and types of genetic molecules and their functions in different cells.
4. Chemical structure and functioning of different biological molecules: carbohydrates, lipids, proteins, and nucleic acids in physiological property of animals.
5. Explain the basic pathways and mechanisms in biological energy transduction from oxidation of metabolites to synthesis of ATP.
6. Understand the Causes, Processes, and Consequences of Evolution.
7. Understand the Principal Mechanisms of Evolution through the process of macro, micro and mega evolutionary process.

Syllabus

UNIT SCHEDULE

Block I: Genetics
Unit 1: Mendalism and Elements of heredity
Unit 2: Chromosomal Mutation
Unit 3: Genetic interaction
Unit 4: Human genetics

Block II: Taxonomic concept
Unit 5: Taxonomy and Systematics
Unit 6: Zoological Nomenclature
Unit 7: Kinds of taxonomic characters and classification
Unit 8: Concepts of Species

Block III. Evolution
Unit 9: Origin of life
Unit 10: Concept of organic evolution
Unit 11: Theory of organic evolution
Unit 12: Evolutionary concept
Unit 13: Zoogeographical realms
Genetics, Taxonomy and Evolution (BSCZO103)

UNIT WISE CONTENTS

Block I: Genetics

Unit 1: Mendalism and Elements of heredity

Elements of heredity and variation, Mendel’s principles of heredity, linkage (Coupling and repulsion), crossing-over (mechanism, theories and importance). Chromosomal mapping (Three point cross).

Unit 2: Chromosomal Mutation

Classification, Translocation, Inversion, Deletion, Duplication, Euploid, Aneuploid and Polysomy

Unit 3: Genetic interaction

Gene structure and function

Unit 4: Human genetics

Recessive inherited disorder, dominant inherited disorder, inborn errors

Block II: Taxonomic concept

Unit 5: Taxonomy and Systematic

Introduction to taxonomy and its relationship with systematic. Importance and applications of biosystematics.

Unit 6: Zoological Nomenclature

International Code of Zoological Nomenclature, Bionomical and Trinomial components of classification.

Unit 7: Kinds of taxonomic characters and classification

Taxonomic characters: Morphological, Embryological, Cytogenetically, Biochemical and Numerical. Components of classification and Linnaean hierarchy.

Unit 8: Concepts of Species

Concept of species and speciation and potential modes of speciation.
Block III. Evolution

Unit 9: Origin of life

Special creation theory, theories of spontaneous generation, cosmozoic theory, theory of chemical evolution and spontaneous origin of life at molecular level

Unit 10: Concept of organic evolution

Concept of organic evolution: evidences from paleontology (types of fossils and determination of age of rocks and fossils), taxonomy, comparative anatomy, comparative embryology, physiology and biochemistry and cytology.

Unit 11: Theory of organic evolution

Theories of organic evolution: Lamarckism, Darwinism, Mutation theory and modern synthetic theory

Unit 12: Evolutionary concept

Modern evolutionary Concept and details of micro, macro and mega evolution

Unit 13: Zoogeographical realms

Major Zoo-geographical realms and distribution patterns of animals in different zoogeographical realms. Biogeographically regions in India.

Suggested Readings:

3. De Robertis & De Robertis: Cell and Molecular Biology.
10 Rastogi: Organic Evolution (1988, Kedarnath & Ramnath)
11 Strickberger: Evolution (2004, Jones & Bartlett)