St. Xavier's College – Autonomous Mumbai

Syllabus
For I Semester Courses in Zoology
(June 2019 onwards)

Contents:

Theory Syllabus for Courses:

SZOO0101 - Invertebrate Systematics and Biomolecules

SZOO0102 - Genetics and Evolution

Practical Syllabus for Course: SZOO1PR

F.Y.B.Sc. Zoology SZOO0101

INVERTEBRATE SYSTEMATICS AND BIOMOLECULES

Learning Objectives:

- To teach student basic classification and characteristics of invertebrates and special adaptations of these phyla
- To understand the structure and functioning of basic biomolecules.

UNIT I

INVERTEBRATE CLASSIFICATION –I 15 lectures

- Salient features and adaptations for Phyla and classes.
  - Phylum Protozoa – Reproduction and Skeleton
  - Phylum Porifera- Spicules, canal system
  - Phylum Coelenterata / Cnidaria – Polymorphism, Corals and Coral reefs
  - Phylum Platyhelminthes – Parasitic adaptations in helminthes
  - Phylum Nematoda – Life cycle of ascaris

UNIT II

INVERTEBRATE CLASSIFICATION –II 15 lectures

- Salient features and adaptations for Phyla and classes.
  - Phylum Annelida – Metamerism and Reproduction
  - Phylum Arthropoda – Crustacean larvae
  - Phylum Mollusca – Foot and shells, Torsion
  - Phylum Echinodermata – Water vascular system

UNIT III 15 lectures

BIOMOLECULES

- **Proteins:**
  - Amino acids: Structure and types of amino acids (aliphatic, aromatic, essential, non-essential amino acids)
  - Definition and structure (primary, secondary, tertiary and quaternary) and types of proteins (fibrous, globular, homonomous, heteronomous and oligomeric)
  - Biological role of proteins.
- **Carbohydrates:**
  - Definition of carbohydrates and its classification with egs. Monosaccharides – Glucose, fructose, galactose. Disaccharides – maltose, sucrose, lactose. Polysaccharides – Starch, glycogen, cellulose, chitin and heparin
  - Biological role of Carbohydrates
- **Lipids:**
  - Definition of Lipids, properties and its classification with egs.
  - Essential fatty acids and its importance
  - Biological role of lipids
- Nucleic acids:
  - Definition of nucleic acids and its types – DNA and RNA
  - Structures of purines and pyrimidines

- Types of DNA and RNA and its biological role

Recommended References:

1. Invertebrate Zoology by E.L Jordan and P.S. Verma
2. Invertebrate Zoology by P.S. Dhami and J.K. Dhami
3. Modern Textbook of Zoology - Invertebrates by Kotpal
4. Invertebrate Zoology by Ruppert Barnes
5. Biochemistry - Lehninger
6. Biochemistry – Harper
7. Biochemistry – Conn & Stumpf
8. Biochemistry – Deb
9. Biochemistry – Satyanarayan

CIA modalities:

CIA I – Short answers for 5 marks each with options
CIA II – Multiple choice questions/ Crosswords/True or False/Fill in the blanks/Definitions

Practical Course:

1. Invertebrate classification

Protozoa:	Amoeba, Euglena, Paramoecium,
Porifera:	Leucosolenia, bath sponge, hyalonema (glass rope sponge)
Coelenterata:	Hydra, Obelia colony, Aurelia, any one coral
Platyhelminthes:	Planaria, Liver fluke, Tapeworm
Nematoda:	Ascaris (male and female)
Annelida:	Earthworm, Leech, Nereis
Arthropoda:	Crab, lobster, Lepisma, beetle, dragonfly, butterfly, spider, centipede, millipede
Mollusca:	Chiton, Dentalium, Pila, bivalve, Sepia, Nautilus
Echinodermata:	Starfish, brittle star, sea urchin, sea cucumber, feather star

2. Mounting of Parapodium from Nereis
3. Mounting of Spicules from Sponge
4. Extraction and qualitative detection of nucleic acids: DNA (SDS-NaCl extraction), RNA (Phenol extraction)
5. Qualitative tests for proteins, lipids and carbohydrates.
6. Identification of crustacean and echinoderm larvae.
7. Study of types of shells and foot in Mollusca

Field Trip: Field visit to a rocky beach or SGNP

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F.Y.B.Sc. Zoology SZOO0102

GENETICS AND EVOLUTION

Learning Objectives:

- To understand the fundamentals of Mendelian genetics and its application
- To understand the basic molecular mechanisms in Mendelian genetics
- To be acquainted with the basics of evolution and the driving forces for the same

UNIT 1
MENDELIAN GENETICS (20 lectures)

- Concept of gene and allele in genetics
- Concept of Dominance, Segregation and Independent Assortment
- Mendelian Monohybrid inheritance
- Exceptions to Monohybrid inheritance: Lethal genes, Co-dominance and Incomplete dominance.
- Mendelian Dihybrid inheritance.
- Variations of Dihybrid inheritance: Recessive Epistasis, Dominant Epistasis, Inhibitory gene interaction.
- Multiple Alleles: Concept. Human Blood group system and Coat colour in Rabbits: Understanding the emergence of these multiple allelic systems
- Cytoplasmic inheritance: Kappa particles in Paramecium, Shell coiling in Snails

UNIT 2
HUMAN GENETICS (10 lectures)

- Mendelian genetics in humans:
  Autosomal Dominant inheritance: Huntington's chorea disorder,
  Autosomal recessive inheritance: Harlequin-type Ichthyosis
  X-linked recessive inheritance: Duchenne muscular dystrophy,
  X-linked Dominant inheritance: Rett Syndrome.
- Human pedigree analysis based on inheritance patterns.
- Chromosomal Abberations: - Numerical abnormality: Monosomy – Turner Syndrome; Tetrasomy/Trisomy – Down Syndrome.

UNIT 3
EVOLUTION (15 lectures)

- Why study evolution
- Theories of Evolution:
  - Prebiotic evolution
  - Panspermia
  - Biotic evolution
- Concept of Microevolution and Co-evolution
- Factors affecting Evolution: Natural Selection, Genetic Drift, Mutation, Migration
- Speciation mechanisms: Allopatric and Sympatric speciation
- Isolating mechanisms in nature: Spatial, Ethological, Reproductive

Recommended References:

1. Genetics – Strickberger. CB publications
2. iGenetics – Russel.
3. Genetics – Gardener
4. Genetics – Winchester. Oxford IBH publication
5. Principles of Genetic - Sinnot, Dunn and Dobzansky. McGraw Hill Publication
6. Basic human genetics - E.J.Mange and A.P.Mange. Rastogi Publication

CIA modalities:

CIA I – Short answers for 5 marks each with options
CIA II – Multiple choice questions/ Crosswords/True or False/Fill in the blanks/Definitions

Practical Course:

1. Modification of feet in Birds
2. Modification of beaks in Birds
3. Study of fossil and living fossils: Ammonite, Trilobite, Lingula, Limulus
4. Human Pedigree analysis: X-linked recessive, X-linked dominant, autosomal dominant, autosomal recessive trait
5. Multiple alleles
6. Study of Geological Time Scales

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