

**Course: 1**                      **INTRODUCTION TO CLASSICAL BIOLOGY**

**Hours/Week: 5**

**Credits: 4**

### **Learning objectives**

The student will be able to learn the diversity and classification of living organisms and understand their chemical, cytological, evolutionary and genetic principles.

### **Learning Outcomes**

1. Learn the principles of classification and preservation of biodiversity
2. Understand the plant anatomical, physiological and reproductive processes.
3. Knowledge on animal classification, physiology, embryonic development and their economic importance.
4. Outline the cell components, cell processes like cell division, heredity and molecular processes.
5. Comprehend the chemical principles in shaping and driving the macromolecules and life processes.

### **Unit 1: Introduction to systematics, taxonomy and ecology.**

- 1.1. Systematics – Definition and concept, Taxonomy – Definition and hierarchy.
- 1.2. Nomenclature – ICBN and ICZN, Binomial and trinomial nomenclature.
- 1.3. Ecology – Concept of ecosystem, Biodiversity and conservation.
- 1.4. Pollution and climate change. **Unit 2: Essentials of Botany.**

- 2.1. The classification of plant kingdom.
- 2.2. Plant physiological processes (Photosynthesis, Respiration, Transpiration, phytohormones).
- 2.3. Structure of flower – Micro and macro sporogenesis, pollination, fertilization and structure of mono and dicot embryos.
- 2.4 Mushroom cultivation, floriculture and landscaping.

### **Unit 3: Essentials of Zoology**

- 3.1. The classification of Kingdom Animalia and Chordata.
- 3.2 Animal Physiology – Basics of Organ Systems & their functions, Hormones and Disorders

3.3 Developmental Biology – Basic process of development (Gametogenesis, Fertilization, Cleavage and Organogenesis)

3.4 Economic Zoology – Sericulture, Apiculture, Aquaculture

#### **Unit 4: Cell biology, Genetics and Evolution**

4.1. Cell theory, Ultrastructure of prokaryotic and eukaryotic cell, cell cycle.

4.2. Chromosomes and heredity – Structure of chromosomes, concept of gene.

4.3. Central Dogma of Molecular Biology.

4.4. Origin of life

#### **Unit 5: Essentials of chemistry**

5.1. Definition and scope of chemistry, applications of chemistry in daily life.

5.2. Branches of chemistry

5.3. Chemical bonds – ionic, covalent, noncovalent – Vander Waals, hydrophobic, hydrogen bonds. 5.4. Green chemistry

#### **References**

1. Sharma O.P., 1993. Plant taxonomy. 2<sup>nd</sup> Edition. McGraw Hill publishers.
2. Pandey B.P., 2001. The textbook of botany Angiosperms. 4<sup>th</sup> edition. S. Chand publishers, New Delhi, India.
3. Jordan E.L., Verma P.S., 2018. Chordate Zoology. S. Chand publishers, New Delhi, India.
4. Rastogi, S.C., 2019. Essentials of animal physiology. 4<sup>th</sup> Edition. New Age International Publishers.
5. Verma P.S., Agarwal V.K., 2006. Cell biology, genetics, Molecular Biology, Evolution and Ecology. S. Chand publishers, New Delhi, India.
6. Satyanarayana U., Chakrapani, U., 2013. Biochemistry. 4<sup>th</sup> Edition. Elsevier publishers.
7. Jain J.L., Sunjay Jain, Nitin Jain, 2000. Fundamentals of Biochemistry. S. Chand publishers, New Delhi, India.
8. Karen Timberlake, William Timberlake, 2019. Basic chemistry. 5<sup>th</sup> Edition. Pearson publishers.
9. Subrata Sen Gupta, 2014. Organic chemistry. 1<sup>st</sup> Edition. Oxford publishers.

#### **ACTIVITIES:**

1. Make a display chart of life cycle of nonflowering plants.
2. Make a display chart of life cycle of flowering plants.
3. Study of stomata
4. Activity to prove that chlorophyll is essential for photosynthesis

5. Study of pollen grains.
  6. Observation of pollen germination.
  7. Ikebana.
  8. Differentiate between edible and poisonous mushrooms.
  9. Visit a nearby mushroom cultivation unit and know the economics of mushroom cultivation.
  10. Draw the Ultrastructure of Prokaryotic and Eukaryotic Cell
  11. Visit to Zoology Lab and observe different types of preservation of specimens
  12. Hands-on experience of various equipment – Microscopes, Centrifuge, pH Meter, Electronic Weighing Balance, Laminar Air Flow
  13. Visit to Zoo / Sericulture / Apiculture / Aquaculture unit
- List out different hormonal, genetic and physiological disorders from