P.B.SIDDHARTHA COLLEGE OF ARTS & SCIENCE

Siddhartha Nagar, Vijayawada – 520 010

Autonomous -ISO 9001 – 2015 Certified

Title of the Paper: INTRODUCTION TO CLASSICAL BIOLOGY

Offered to: Botany Honors, Zoology Honors with Programme code

Course Type: Theory **Year of Introduction:** 2023-2024

Year of Revision: **Percentage of Revision:**

Semester: I **Credits:** 04

Hours Taught: 60 hrs. per Semester **Max. Time**: 5 Hours

Course Prerequisites: Knowledge of Introduction to classical biology at +2 level.

Course Description: This course will provide one with a basic and comprehensive understanding of diversity and classification of living organisms. Enable the student with depth of topics and helps them to gain an appreciation in the cytological evolution and genetic principles. On the other hand, importance of understanding the animal classification, physiology and their economic importance provides an extensive knowledge to the student.

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. (12Hrs)

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 (Structure and functions-outlines)

Biodiversity and conservation. (Value of Biodiversity and types of conservation)

1.4. Pollution - Causes, effects and control measures of Air, Water and Soil pollution
Climate change - Global warming, Greenhouse gases**,** Ozone depletion, Acid rains

Unit 2: Essentials of Botany. (12Hrs)

2.1. The classification of plant kingdom. (Whittaker system of Classification)
2.2. Plant physiological processes (Photosynthesis - light & dark reactions, Respiration (- glycolysis, link reaction, Krebs cycle & oxidative phosphorylation, Transpiration- types , stomatal complex, mechanism of stomatal movement based on K+ ion movement), phytohormones- physiological role of Auxins, Gibberellins, Cytokinins, Abscissic acid ,Ethylene).

2.3. Structure of flower – Micro and macro sporogenesis, pollination- (types & agents), fertilization and structure of mono and dicot embryos.

2.4. Mushroom cultivation, (Milky mushroom) floriculture **(two** local flowers) and landscaping-principles

Unit 3: Essentials of Zoology (12Hrs)

3.1. Broad classification of kingdom animalia up to phyla
3.2. Animal physiology- basics of organ systems and 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 (Concepts and economic importance)

Unit 4: Evolution, Cell Biology and Genetics (12Hrs)

4.1 Origin of life
4.2 Cell theory, Ultrastructure of prokaryotic and eukaryotic cell, cell cycle.(outlines only)

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

4.4 Central Dogma of Molecular Biology (outlines of transcription and translation role of genetic code.

Unit 5: Essentials of chemistry (12Hrs)

5.1. Definition and scope of chemistry, applications of chemistry in daily life.(chemistry in food, agriculture, hygiene, cosmetics, textiles and construction)

5.2. Branches of chemistry (inorganic, organic, physical, analytical and industrial chemistry)

5.3. Chemical bonds – ionic, covalent, non-covalent – Vander Waals, hydrophobic, hydrogen bonds.

5.4. Green chemistry

References

1. Sharma O.P., 1993. Plant taxonomy. 2nd Edition. McGraw Hill publishers.

2. Pandey B.P., 2001. The textbook of botany Angiosperms. 4th 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. 4th 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. 4th 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. 5th Edition. Pearson publishers.

9. Subrata Sen Gupta, 2014. Organic chemistry. 1st 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 stoma
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 / Aqua culture unit
14. List out different hormonal, genetic and physiological disorders from the society

Web Links:
https://www.youtube.com/watch?v=IA0DhWDTUpU
https://www.youtube.com/watch?v=s9NDXk7Gs8Y

Max. Marks : 70 **Max. Time : 3 Hrs**

SECTION -A

Answer all Questions. **(5 X 4 =20)**

1 (a) Write short note on nomenclature 4M L1

OR

(b) Describe briefly about greenhouse gases 4M L1

2 (a) write the structure and functions of mitochondria 4M L2

OR

(b) explain the process of landscaping 4M L2

3 (a) write a short note on phylum arthropoda 4M L2

OR

(b) discuss briefly about aquaculture and their importance 4M L2

4 (a) distinguish between prokaryotic and eukaryotic cell 4M L3

OR

(b) write a definition on transcription and translation 4M L3

5 (a) write a brief account on applications of chemistry in agriculture 4M L3

OR

(b) write a short note on ionic bond 4M L3

SECTION –B

Answer all Questions. **(5 X 10 = 50)**

6. (a) write an essay on different conservation methods of biodiversity 10M L1

OR

(b) describe in detailed causes, effects and control measures of air pollution 10M L1

7. (a) explain the process of cultivation in milky mushroom 10M L2

OR

(b) write an account on plant hormones 10M L2

8. (a) explain the process of gametogenesis 10M L1

OR

(b) Give a detailed account on economic importance of aquaculture 10M L1

9. (a) Describe in detail the ultrastructure of chromosome 10M L2

OR

(b) Explain in detail central dogma of molecular biology 10M L2

10. (a) Explain about the green chemistry and brief account of their principles 10M L2

OR

(b) Describe the non-covalent bonds and mention the types of non-covalent bonds 10M L2

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