

ANDHRA KESARI UNIVERSITY



B. Voc. Honours Medical Lab Technology: Single Major

w.e.f AY 2023-24 onwards

COURSE STRUCTURE

Year	Semester	Course	Title	No. Hrs./ Week	No. of Credits
I	I	1	Introduction to Classical Biology	5	4
		2	Introduction to Applied Biology	5	4

I -Semester

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 – Eichler system of classification.
- 2.2. Vegetative parts of a Plant and physiological processes –outlines of water & mineral absorption, Ascent of sap, transpiration, Photosynthesis, Respiration and Growth hormones.
- 2.3. Structure of flower – Essential and Non – Essential organs, microsporangium - structure of anther, megasporangium, structure of ovule, pollination & fertilization.
- 2.4. floriculture, landscaping & plant Nursery (Basics)

Unit 3: Essentials of Zoology

- 3.1. The classification of Kingdom Animalia and Chordata.
- 3.2 Heart, lung, kidney, Organ Systems & their functions in Humans;
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.
- 4.2. Chromosomes and heredity – Structure of chromosomes nucleosome, DNA & RNA.
- 4.3. Cell Cycle, Mitosis & Meiosis.
- 4.4. Mendel's laws & Darwin theory of evolution.

Unit 5: Essentials of chemistry

- 5.1. Definition and scope of Chemistry, applications of Chemistry in daily life. Branches of Chemistry.
- 5.2. Chemical bonds – ionic, covalent, noncovalent – Vander Waals, hydrophobic, hydrogen bonds.
- 5.3. Green chemistry principles, prevention of waste, prevention of hazardous components,
- 5.4. Green synthesis of catechol, accident prevention & safety measures.

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 the life cycle of nonflowering plants.
2. Make a display chart of the 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. Draw the Ultrastructure of Prokaryotic and Eukaryotic Cell
8. Visit to Zoology Lab and observe different types of preservation of specimens
9. Hands-on experience of various equipment – Microscopes, Centrifuge, pH Meter, Electronic Weighing Balance, Laminar Air Flow
10. Visit to Zoo / Sericulture / Apiculture / Aquaculture unit
11. List out different hormonal, genetic and physiological disorders from the societ

I -Semester

Course: 2 INTRODUCTION TO APPLIED BIOLOGY

Hour/Weeks: 5

Credits: 4

Learning objectives

The student will be able to learn the foundations and principles of microbiology, immunology, biochemistry, biotechnology, analytical tools, quantitative methods, and bioinformatics.

Learning Outcomes

1. Learn the history, ultrastructure, diversity and importance of microorganisms.
2. Understand the structure and functions of macromolecules.
3. Knowledge on biotechnology principles and its applications in food and medicine.
4. Outline the techniques, tools and their uses in diagnosis and therapy.
5. Demonstrate the bioinformatics and statistical tools in comprehending the complex biological data.

Unit 1: Essentials of Microbiology

- 1.1. History and Major Milestones of Microbiology; Contributions of Edward Jenner, Louis Pasteur, Robert Koch.
- 1.2. Groups of prokaryotic microbes – Bacteria (Structure, and Types), archaeobacteria, Mycoplasma; Eukaryotic Microbes(outlines)
- 1.3. Applications of microorganisms in – Food, Agriculture, Environment, and Industry.
- 1.4. Viruses – plant virus – TMV (Structure and Disease Symptoms) Animal virus – polio virus (Structure and Disease Symptoms) & Bacteriophage(Structure and Reproduction Outlines)

Unit 2: Essentials of Biochemistry and Immunology

2.1. Biomolecules I

Introduction of carbohydrates & classification – mono di and Polysaccharides.

Lipids. Introduction, Structure & types – Biological importance.

2.2. Biomolecules II

Amino acids – classification, properties, structure & functions.

Proteins – classification, properties, structure & functions.

2.3. Biomolecules III

DNA – Structure &

TypesRNA – Structure
& Types

2.4. Immune **System** –
Immunity, types of
Immunity, cells &
organs of Immune
Systems.

Unit 3: Essentials of Biotechnology

- 3.1. History, scope, and significance & branches of biotechnology.
- 3.2. Recombinant DNA Technology and Vectors-PBR322 & PUC18
- 3.3. Transgenic plants – Uses and applications-B. T Cotton. Transgenic animals – Dolly Sheep.
- 3.4. Environmental Biotechnology – Bioremediation, Bio – Fuels, Bio-fertilizers & Biopesticides.

Unit 4: Analytical Tools and Applications

- 4.1. Microscopy – Simple, compound and electron microscope.
- 4.2. Southern Blotting Northern Blotting and western blotting
- 4.3. Electrophoresis
- 4.4. Monoclonal antibodies and Its applications. Applications in forensics-DNA Fingerprinting and PCR

Unit 5: Biostatistics and Bioinformatics

- 5.1. Data collection and sampling. Measures of central tendency – Mean, Median, Mode.
- 5.2. Measures of dispersion – Range, standard deviation, Basics of Chi-square Test and t-test
- 5.3. Introduction to Bioinformatics – Genomics, Proteomics, types of biological databases – NCBI, EBI.
- 5.4. Accessing Nucleic Acid and Protein databases, NCBI, Genome Workbench

REFERENCES

- 1. Gerard J., Tortora, Berdell R. Funke, Christine L. Case., 2016. Microbiology: An Introduction. 11th Edition. Pearson publications, London, England.
- 2. Micala, J. Pelczar Jr., E.C.S. Chan., Noel R. Kraig., 2002. Pelczar Microbiology. 5th Edition. McGraw Education, New York, USA.
- 3. Sathyanarayana U., Chakrapani, U., 2013. Biochemistry. 4th Edition. Elsevier publishers.
- 4. Jain J.L., Sunjay Jain, Nitin Jain, 2000. Fundamentals of Biochemistry. S. Chand

publishers, New Delhi, India.

5. R.C. Dubey, 2014. Advanced Biotechnology. S. Chand Publishers, New Delhi, India.
6. Colin Ratledge, Bjorn, Kristiansen, 2008. Basic Biotechnology. 3rd Edition. Cambridge Publishers.
7. U. Sathyanarayana, 2005. Biotechnology. 1st Edition. Books and Allied Publishers pvt. ltd., Kolkata.
8. Upadhyay, Upadhyay and Nath. 2016. Biophysical Chemistry, Principles and Techniques. Himalaya Publishing House.
9. Arthur M. Lesk. Introduction to Bioinformatics. 5th Edition. Oxford publishers.
10. AP Kulkarni, 2020. Basics of Biostatistics. 2nd Edition. CBS publishers.

ACTIVITIES

1. Identification of a given organism as harmful or beneficial.
2. Observation of microorganisms from house dust under microscope.
3. Finding microorganisms from pond water.
4. Visit to a microbiology industry or biotech company.
5. Visit to a wastewater treatment plant.
6. Retrieving a DNA or protein sequence of a gene'
7. Performing a BLAST analysis for DNA and protein.
8. Problems in biostatistics.
9. Field trip and awareness programs on environmental pollution by different types of wastes and hazardous materials.
10. Demonstration on basic biotechnology lab equipment.
11. Preparation of 3D models of genetic engineering techniques.
12. Preparation of 3D models of transgenic plants and animals.

[NOTE: In the colleges where there is availability of faculty for microbiology and biotechnology, those chapters need to be handled by microbiology and biotechnology faculty. In other colleges, the above topics shall be dealt by Botany and Zoology faculty.

ANDHRA KESARI UNIVERSITY-ONGOLE, PRAKASAM DISTRICT
Single Major Programme from the Year 2023-24 Onwards Programme- B.Voc
Honours. Horticulture/Agriculture/Medical Lab Technology
&
B.Sc.Honours Botany/Microbiology/Zoology/Aquaculture/Biochemistry/Biotechnology
Question Paper model, First Year-Semester-1
Course1 - Introduction to Classical Biology

Time: 3 Hours

Total Marks: 75

PART –A

Answer any Five of the following.

Note: Draw labelled diagrams wherever necessary and Each unit must carry two questions

5X5=25 Marks

1. Unit-1
2. Unit-1
3. Unit-2
4. Unit-2
5. Unit-3
6. Unit-3
7. Unit-4
8. Unit-4
9. Unit-5
10. Unit-5

PART –B

Answer any **Five** of the following

Note: Draw labelled diagrams wherever necessary

5X10=50 Marks

(Paper setters must give the 2 questions from Each unit)

11. Unit-1
12. Unit-1
13. Unit-2
14. Unit-2
15. Unit-3
16. Unit-3
17. Unit-4
18. Unit-4
19. Unit-5
20. Unit-5

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Question Paper model, First Year-Semester-1
Course 2 - Introduction to Applied Biology

Time: 3 Hours

Total Marks: 75

PART –A

Answer any Five of the following.

Note: Draw labelled diagrams wherever necessary and Each unit must carry two questions
5X5=25 Marks

1. Unit-1
2. Unit-1
3. Unit-2
4. Unit-2
5. Unit-3
6. Unit-3
7. Unit-4
8. Unit-4
9. Unit-5
10. Unit-5

PART –B

Answer any **Five** of the following

Note: Draw labelled diagrams wherever necessary
(Paper setters must give the 2 questions from Each unit)

5X10=50 Marks

11. Unit-1
12. Unit-1
13. Unit-2
14. Unit-2
15. Unit-3
16. Unit-3
17. Unit-4
18. Unit-4
19. Unit-5
20. Unit-5

