

**SRI VENKATESWARA UNIVERSITY - TIRUPATI**

**B.S.c., (Honours) in ZOOLOGY (MAJOR)**

**FIRST YEAR – II SEMESTER**

**(W.E.F. Academic Year 2023 - 24)**

**COURSE 3: ANIMAL DIVERSITY-I BIOLOGY OF NON-CHORDATES**

Theory

Credits: 3

3 hrs/week

**LEARNING OBJECTIVES:**

- To understand the taxonomic position of protozoa to helminthes.
- To understand the general characteristics of animals belonging to protozoa to hemichordata.
- To understand the structural organization of animals phylum from protozoa to hemi chordata.
- To understand the origin and evolutionary relationship of different phyla from protozoa to hemi chordata.
- To understand the origin and evolutionary relationship of different phylum from annelids to hemichordates.

**LEARNING OUTCOMES:** By the completion of the course the graduate should able to –

- Describe concept of animal kingdom classification and general characters of Protozoa
- Classify Porifera and Coelenterata with taxonomic keys
- Classify Phylum Platy & Nematelminthes using examples, parasitic adaptation
- Describe Phylum Annelida & Arthropoda using examples and economic importance of vermicomposting & economic importance of insects.
- Describe Mollusca, Echinodermata & Hemi chordata with suitable examples in relation to the phylogeny

**SYLLABUS:**

**UNIT-I**

Protozoa General Characters and classification up to classes with suitable examples  
Protozoa Locomotion & nutrition  
Protozoa reproduction

*Activity: Assignment /Seminar on the above*

*Evaluation: Marks to be awarded for written and oral presentations*

**UNIT –II**

Porifera General characters and classification up to classes with suitable examples  
Canal system in sponges  
Coelenterata General characters and classification up to classes with suitable examples  
Polymorphism in coelenterates & Corals and coral reefs

*Activity: Assignment /Seminar /Quiz/Project on the above*

*Evaluation: Evaluation of Written part + Evaluation of oral Presentation, Assessment of students in Quiz participation and Ranking - Evaluation of Project Report and oral presentation*

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### UNIT – III

Platyhelminthes General characters and classification up to classes with suitable examples

Parasitic Adaptations in helminthes

Nemathelminthes General characters and classification up to classes with suitable examples

Life cycle and pathogenicity of *Ascaris lumbricoides*

**Activity:** *Assignment /Seminar /Quiz/Project/Peer teaching on the above*

**Evaluation:** *Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity*

### UNIT – IV

Annelida General characters and classification up to classes with suitable examples

Vermiculture - Scope, significance, earthworm species, processing, Vermicompost, economic importance of vermicompost

Arthropoda General characters and classification up to classes with suitable examples

*Peripatus* - Structure and affinities

**Activity:** *Assignment /Seminar /Quiz/Project/Peer teaching on the above*

**Evaluation:** *Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity*

### UNIT – V

Mollusca General characters and classification up to classes with suitable examples

Pearl formation in Pelecypoda

Echinodermata General characters and classification up to classes with suitable examples

Water vascular system in star fish

Hemichordata General characters and classification up to classes with suitable examples

*Balanoglossus* - Structure and affinities

**Activity:** *Assignment /Seminar /Quiz/Project/Peer teaching on the above*

**Evaluation:** *Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity*

#### **Co-curricular activities (suggested)**

- Preparation of chart/model of phylogenetic tree of life, 5-kingdom classification
- Visit to Zoology Museum or Coral Island as part of Zoological tour
- Charts on polymorphism
- Clay models of canal system in sponges
- Plaster-of-paris model of *Peripatus*
- Construction of a vermicompost in each college, manufacture of manure by students and donating to local farmers
- Chart on pearl forming layers using clay
- Visit to a pearl culture rearing industry/institute
- Live model of water vascular system
- Observation of *Balanoglossus* for its tubicolous habit

#### **REFERENCE BOOKS:**

- L.H. Hyman „*The Invertebrates*’ Vol I, II and V. – M.C. Graw Hill Company Ltd.

- Kotpal, R.L. 1988 - 1992 Protozoa, Porifera, Coelenterata, Helminthes, Arthropoda, Mollusca, Echinodermata. Rastogi Publications, Meerut.
- E.L. Jordan and P.S. Verma „*Invertebrate Zoology*’ S. Chand and Company.
- R.D. Barnes „*Invertebrate Zoology*’ by: W.B. Saunders CO., 1986.
- Barrington. E.J.W., „*Invertebrate structure and Function*’ by ELBS.
- P.S. Dhami and J.K. Dhami. *Invertebrate Zoology*. S. Chand and Co. New Delhi.
- Parker, T.J. and Haswell, „*A text book of Zoology*’ by, W.A., Mac Millan Co.London.
- Barnes, R.D. (1982). *Invertebrate Zoology*, V Edition”

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**FIRST YEAR – II SEMESTER**  
**(W.E.F. Academic Year 2023 - 24)**  
**MODELQUESTIONPAPER**

**COURSE3:ANIMALDIVERSITY- I BIOLOGYOF NON-CHORDATES**

Time:3hrs

PART-- A

Answer any FIVE of the following questions. Each question carries 5 marks. Draw labeled diagrams wherever necessary.

1. Protozoan nutrition
2. Ciliata
3. General characters of Porifera
4. Corals
5. Parasitic Adaptations in helminthes
6. Vermiculture
7. Mollusca general characters
8. Pearl formation

PART-- B

Answer any **FIVE** of the following questions. Each question carries 10 marks. Draw labelled diagrams where ever necessary.

9. Write about general characters and classification of Protozoa up to classes.
10. Write about Locomotion in Protozoa.
11. Describe the canal system in sponges.
12. Describe the Polymorphism in Coelenterates.
13. Write about general characters and classification of platyhelminthes up to classes.
14. Explain the life cycle and pathogenicity of *Ascaris Lumbricoides*.
15. Write about general characters and classification of Annelida up to classes.
16. Describe the structure and affinities of *Peripatus*.
17. Write about water vascular system in Star Fish.
18. Describe the structure and affinities of *Balanoglossus*.

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**FIRST YEAR – II SEMESTER**

**(W.E.F. Academic Year 2023 - 24) SEMESTER-II**

**COURSE 3: ANIMAL DIVERSITY-I BIOLOGY OF NON-CHORDATES**

Practical

Credits: 1

2 hrs/week

**LEARNING OBJECTIVES**

- To understand the importance of preservation of museum specimens
- To identify animals based on special identifying characters
- To understand different organ systems through demo or virtual dissections
- To maintain a neat, labelled record of identified museum specimens

**SYLLABUS:**

Study of museum slides / specimens / models (Classification of animals up to orders)

- Protozoa: *Amoeba*, *Paramoecium*, *Paramoecium Binary fission and Conjugation*, *Vorticella*, *Entamoeba histolytica*, *Plasmodium vivax*
- Porifera: *Sycon*, *Spongilla*, *Euspongia*, *Sycon- T.S & L.S*, Spicules, Gemmule
- Coelenterata: *Obelia – Colony & Medusa*, *Aurelia*, *Physalia*, *Vevela*, *Corallium*, *Gorgonia*, *Pennatula*
- Platyhelminthes: *Planaria*, *Fasciola hepatica*, *Fasciola larval forms – Miracidium*, *Redia*, *Cercaria*, *Echinococcus granulosus*, *Taenia solium*, *Schistosoma haematobium*
- Nematelminths: *Ascaris (Male & Female)*, *Drancunculus*, *Ancylostoma*, *Wuchereria*
- Annelida: *Nereis*, *Aphrodite*, *Chaetopteurs*, *Hirudinaria*, Trochophore larva
- Arthropoda: *Cancer*, *Palaemon*, *Scorpion*, *Scolopendra*, *Sacculina*, *Limulus*, *Peripatus*, Larvae - Nauplius, Mysis, Zoea, Mouth parts of male & female *Anopheles* and *Culex*, Mouthparts of Housefly and Butterfly.
- Mollusca: *Chiton*, *Pila*, *Unio*, *Pteredo*, *Murex*, *Sepia*, *Loligo*, *Octopus*, *Nautilus*, Glochidium larva
- Echinodermata: *Asterias*, *Ophiothrix*, *Echinus*, *Clypeaster*, *Cucumaria*, *Antedon*, Bipinnaria larva
- Hemichordata: *Balanoglossus*, *Tornaria* larva

**Dissections:**

Computer - aided techniques should be adopted or show virtual dissections Dissection of edible (Prawn/Pila) invertebrate as per UGC guidelines

An “Animal album” containing photographs, cut outs, with appropriate write up about the above-mentioned taxa. Different taxa/ topics may be given to different set of students for this purpose

**REFERENCE WEB LINKS:**

- <https://virtualmicroscopy.peabody.yale.edu/>
- <https://tnhm.in/category/assorted-gallery-for-vertebrates-and-invertebrates/invertebrates/>
- <http://www.nhc.ed.ac.uk/index.php?page=24.25.312>
- <https://biologyjunction.com/invertebrate-notes/>
- <https://lanwebs.lander.edu/faculty/rsfox/invertebrates/>
- <http://www.zoologyresources.com/uploadfiles/books/dc64b77d8769325515d17c945e461b45.pdf>

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**FIRST YEAR – II SEMESTER**

**(W.E.F. Academic Year 2023 - 24)**

**COURSE 4: CELL & MOLECULAR BIOLOGY**

Theory

Credits: 3

3 hrs/week

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**LEARNING OBJECTIVES**

- To understand the cell and distinguish between prokaryotic and eukaryotic cell
- To understand the role of different cell organelles in maintenance of life activities
- To acquaint the students with the concepts of cell division and cell cycle
- To acquaint student with basic concepts of molecular biology as to how characters are expressed with a coordinated functioning of replication, transcription and translation in all living beings
- To acquaint the students on the biological importance of bio molecules.

**LEARNING OUTCOMES:**

The overall course outcome is that the student shall develop deeper understanding of what life is and how it functions at cellular level. This course will provide students with a deep knowledge in Cell and molecular biology by the completion of the course the graduate shall able to –

- Understand the basic unit of the living organisms and to differentiate the organisms by their cell structure.
- Describe fine structure and function of plasma membrane and different cell organelles of eukaryotic cell.
- Explain the cell cycle and bioenergetics of the cell
- Understand the central dogma of molecular biology and flow of genetic information from DNA to proteins
- Understand the gene expression phenomenon and biological importance of biomolecules

**SYLLABUS:**

**UNIT – I Cell Biology-I**

Electron microscopic structure of animal cell.

Plasma membrane –Models and Fluid mosaic model

*Activity: Model preparation of cell/Assignment /Students Seminar /Quiz/Project/Peer teaching on the above*

*Evaluation: Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity*

**UNIT – II Cell Biology-II**

Structure and functions of Golgi complex & Endoplasmic Reticulum

Structure and functions of Lysosomes & Ribosomes

Structure and functions of Mitochondria & Centriole

Structure and functions of Nucleus & Chromosomes

**Activity:** Model preparation of cell organelles/Assignment /Students Seminar /Quiz/Project/Peer teaching on the above

**Evaluation:** Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

### **UNIT – III Cell Biology-III**

Cell Division- mitosis, meiosis

Bio energetics- Glycolysis-Krebs cycle-ETS

**Activity:** Model preparation cell division /Assignment /Students Seminar /Quiz/Project/Peer teaching/Report writing after watching any video on the above

**Evaluation:** Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

### **UNIT IV: Molecular Biology-I**

Central Dogma of Molecular Biology

Basic concepts of - DNA replication

Transcription in prokaryotes and eukaryotes – Initiation, Elongation and Termination, Post-transcriptional modifications (basics) in brief.

Translation in prokaryotes and eukaryotes– Initiation, Elongation and Termination

**Activity:** Model preparation of DNA/Assignment /Students Seminar /Quiz/Project/Peer teaching/Report writing after watching any video on the above

**Evaluation:** Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

### **UNIT V: Molecular Biology-II**

Gene Expression in prokaryotes (Lac Operon); Gene Expression in eukaryotes

Biomolecules- Carbohydrates (Glucose- structure-properties- biological importance only)

Biomolecules- Protein (Amino acid- structure- properties- biological importance only)

Biomolecules- Lipids (Fatty acid- structure - properties- biological importance only)

**Activity:** Assignment /Students Seminar /Quiz/Project/Peer teaching/Report writing after watching any video on the above

**Evaluation:** Instructor supposed to prepare a detailed Rubrics for the evaluation of the above activity

#### **Co-curricular activities (Suggested)**

- Model of animal cell
- Working model of mitochondria to encourage creativity among students
- Photo album of scientists of cell biology
- Charts on plasma membrane models/cell organelles
- Charts on central dogma/lac operon/genetic code
- Model of semi-conservative model of DNA replication
- Power point presentation of any of the above topics by students

**REFERENCES:**

- Lodish, Berk, Zipursky, Matsudaria, Baltimore, Darnell „Molecular Cell Biology“W.H. Freeman and company New York.
- Cell Biology by De Robertis
- Bruce Alberts, Molecular Biology of the Cell
- Rastogi, Cytology
- Varma & Aggarwal, Cell Biology
- C.B. Pawar, Cell Biology
- Molecular Biology by Frei fielder
- Instant Notes in Molecular Biology by Bios scientific publishers and Viva BooksPrivate Limited
- James D. Watson, Nancy H. Hopkins „Molecular Biology of the Gene“

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**MODELQUESTIONPAPER**  
**COURSE 4: CELL AND MOLECULAR BIOLOGY**

Time:3hrs

marks: 75

**PART-- A**

Answer any FIVE of the following questions. Each question carries 5 marks. Draw labelled diagrams where ever necessary.  $5 \times 5 = 25$

1. Golgi bodies
2. Lysosomes
3. Chromatin
4. Endoplasmic reticulum
5. Translation
6. Aminoacids
7. Ribosomes
8. GlucoseStructure

**PART – B**

Answer any FIVE of the following questions. Each question carries 10 marks. Draw labelled diagrams where ever necessary.  $5 \times 10 = 50$

9. Describe the Ultra structure of Animal cell
10. Describe the structure and functions of Plasma membrane.
11. Describe the structure and function of Mitochondria.
12. Describe the structure and function of Chromosomes
13. Write about mitosis cell division.
14. Write about Central Dogma of Molecular Biology.
15. Write an essay on DNA Replication
16. Describe the Transcription in Eukaryotes.
17. Explain the Gene Expression in Prokaryotes.

Write about Lipids properties and Biological importance.

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**COURSE 4: CELL & MOLECULAR BIOLOGY**

Practical

Credits: 1

2 hrs/week

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**LEARNING OBJECTIVES**

- Acquainting and skill enhancement in the usage of laboratory microscope
- Hands-on experience of different phases of cell division by experimentation
- Develop skills on human karyo typing and identification of chromosomal disorders
- To apply the basic concept of inheritance for applied research
- To get familiar with phylogeny and geological history of origin & evolution of animals

**SYLLABUS:**

1. Observation of various stages of Mitosis with prepared slides / charts / photos
2. Observation of various stages of Meiosis with prepared slides / charts / photos
3. Observation of salivary gland chromosomes of *Chironomus* / charts / photos
4. Test for carbohydrate in given biological sample (Benedict's test)
5. Test for Protein in given biological sample (Nitric acid test -white ring)
6. Test for lipid in the given biological sample (Saponification test)

**REFERENCE WEB LINKS:**

- <https://cbi-au.vlabs.ac.in/>
- <https://www.youtube.com/watch?v=xhnUZAYNdQk>
- [https://www.youtube.com/watch?v=l8LXQq5\\_VL0](https://www.youtube.com/watch?v=l8LXQq5_VL0)
- <https://www.labster.com/simulations>
- <https://www.sciencecourseware.org/BiologyLabsOnline/protected/TranslationLab/index.php>
- <https://virtual-labs.github.io/exp-analysis-of-carbohydrates-au/procedure.html>
- [https://www.labxchange.org/library/items/lb:LabXchange:f10fd7ad:lx\\_simulation:1](https://www.labxchange.org/library/items/lb:LabXchange:f10fd7ad:lx_simulation:1)
- <http://www.zoologyresources.com/uploadfiles/books/dc64b77d8769325515d17c945e461b45.pdf>

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