Gyanmanjari Innovative University

Syllabus
Gyanmanjari Science College
Semester-1(B.Sc)

Subject: Invertebrate Zoology-BSC1XX11303
Type of course: Minor
Prerequisite: Basic knowledge of Zoology.
Rationale: This course introduces students to the basic principles of Zoology, focusing on the classification and diversity of invertebrates, their morphology, and functional anatomy. It also provides an overview of animal pathology and parthenogenesis, laying the foundation for advanced studies in biological sciences.
Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks		Total Marks
CI	T	P	C	SEE	CCE	
2	0	4	4	100	100	200

Legends: CI-Class Room Instructions; T – Tutorial; P - Practical; C – Credit; SEE - Semester End Evaluation; LWA - Lab Work Assessment; V – Viva voce; CCE-Continuous and Comprehensive Evaluation; ALA- Active Learning Activities.

Course Content:

Unit No	Course content	Hrs	% Weightage
1	**Diversity of Life** Classification of the following animals up to the classes: ➢ Classification of phylum Protozoa with examples. ➢ Classification of phylum Porifera with examples. ➢ Classification of phylum Coelenterate with examples. ➢ Classification of phylum Platyhelminthes with examples. ➢ Classification of phylum Nemathelminths with examples. **Practical:** **1. Classification of Phylum Protozoa:** Amoeba, Paramecium, Euglena, Arcella, Ceratium, Plasmodium and Opalina **2. Classification of Phylum Porifera:**	T: P 6:12	20%

Grantia, Hylonema, Leucosolenia.

3. **Classification of Phylum Coelenterate:**
Hydra, Sea-anemone, Jellyfish, Physalia, Rhizostoma, Gorgonia, Coral
4. **Classification of Phylum Platyhelminthes and Nemathelminths.**

Platyhelminthes: Liver fluke, Planaria, Tapeworm.
Nemathelminths; Guinea worm, Ascaris (Male & Female) and Filaria.

5. **Class work material** (euglena and paramecium)
6. **Class work material** (Sponges - Gemmule, spicules

Examination Style:

Sr. No.	Evolution Methods	SEE Marks	CCE Marks
1.	**Specimen identification:** Identify the given specimen and classify it up to class with reasons.	10	
2.	**Do as Direct: prepare** the slide. (euglena and paramecium, Gemmule , spicules)	10	
3.	**ALA -1** **Model Making:** Sponge water canal system using sponge & straws.		10
4.	**MCQ** MCQ will be provided from the unit.		10
Total Marks		20	20

2	**Chapter: 2 General Morphology and functional anatomy** **Hydra:** ➢ Habits and habitat ➢ Different methods of locomotion. ➢ Different methods of Reproduction. ➢ Body wall. ➢ Cnedoblast. **Practical:** To Study life history of Hydra.	T: P 6:12	20%

Examination Style:

Sr. No.	Evolution Methods	SEE Marks	CCE Marks
1.	**Poster-Making or Infographic** ➢ Meet the tiny predator Hydra ➢ Hydra regeneration wonder ➢ Hydra: Simple body with complex function ➢ Hydra : the Eternal Life Mystery	20	
2.	**System diagram: ALA-2** Students will prepare a diagram (from the life history of Hydra)		10
3.	**Review the paper:** Review a paper published on the Hydra animal.		10
Total Marks		20	20

3	**Chapter:3** **Diversity of Life** ➢ Classification of phylum Annelida up to class with examples. ➢ Classification of phylum Arthropod up to class with ➢ examples. ➢ Classification of phylum Mollusca up to class with examples. ➢ Classification of phylum Echinodermata up to class ➢ with examples. **Practical:** 1. **Classification of phylum Annelida and up to the classes.** Annelida: Nereis, Earthworm, Leech. 2. **Classification of phylum Arthropoda up to the classes** Arthropod: Paripatus, Crab, Prawn, Centipede, Millipede, Bed bug, Grasshopper, Scorpion, Tick.	T: P 6:12	20%

3. **Classification of phylum Mollusca up to the classes.** Mollusca: Chiton, Pila, Unio, Pearl oyster, Sepia, Dentalium.
4. **Classification of phylum Echinodermata up to the classes:** Starfish, Brittle star, Sea cucumber, Sea- lily, Sea-urchin.

Examination Style:

Sr. No.	Evolution Methods	SEE Marks	CCE Marks
1.	**Explore & Explain" – Invertebrate Phyla in the Campus Biodiversity Tour** Make notes and classify the invertebrates found on the university campus with photograph.	15	
2.	**Presentation on Phylum** Student will be given a phylum and will give a presentation on it.		10
3.	**ALA-3** Unit-related assignments will be provided by the faculty, which will have to be prepared by the students.**(Ex-Economic importance of Arthropod)**		10
4.	**Journal:** Prepare and submit a journal of the practical given of the unit.	5	
Total Marks		20	20

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Chapter 4.
General Morphology and Functional Anatomy of Earthworm and Animal Pathology
➢ External character.
➢ Body Wall.
➢ Digestive system.
➢ Reproductive system.
➢ Nervous systems.
➢ Septal Nephridia.
➢ Blood Gland.
➢ Setae.
Practical
1. To Study External characters of Earthworm by chart or multimedia.
2. To Study Digestive system of Earthworm by chart or multimedia.
3. To Study Reproductive system of Earth worm by chart or multimedia.
4. To Study Nervous system of Earth worm by char or multimedia.
Examination Style:
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<tr><th>Sr. No.</th><th>Evolution Methods</th><th>SEE Marks</th><th>CCE Marks</th></tr>
<tr><td>1.</td><td>Diagram-Based on the system + voice viva
Any system of Earth worm animal will be given by the faculty. Then it will be drawn by the student and viva will be given.</td><td>15</td><td></td></tr>
<tr><td>2.</td><td>Video presentation:
ALA-4
Earthworm as a bio-indicator of soil health.</td><td></td><td>20</td></tr>
<tr><td>3.</td><td>Journal:
Prepare and submit a journal of the practical given of the unit.</td><td>5</td><td></td></tr>
<tr><td colspan="2">Total Marks</td><td>20</td><td>20</td></tr>
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Chapter 5.
Parthenogenic invertebrates:
Introduction,
1. Entamoeba histolytic
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2. Fasciola hepatica
3. Taenia Solium
4. Ascaris lumbricoides
5. Anopheles mosquito

Practical

1. **Practical**: Observation of amoebic cysts in multimedia or slides
2. **Practical**: Life cycle model study: Draw and label stages from egg → miracidium → sporocyst → redia → cercaria → metacercaria → adult.
3. **Practical**: Study of scolex and proglottid through multimtdia or slides
4. **Practical:** Study of Pathogenic Characteristics of Ascaris lumbricoides Life cycle chart/model
5. **Practical:** Observation of life cycle stages (egg, larva, pupa, adult) by chart or multimedia.

Examination Style:

Sr. No.	Evolution Methods	SEE Marks	CCE Marks
1.	**Clinical Case Studies: ALA-5** Scenarios will be given by the faculty so they need to give information of above questions and submit online and give viva **Questions:** **I.** Identify the probable parasite. **II.** Explain the parasite's life cycle relevant to this case. **III.** Suggest preventative measures to avoid reinfection. **IV.** Discuss the pathology caused by this parasite.		**20**

	2.	**Identification of Pathogens and Viva** Identify and give a viva from the given photos.	10			
	3.	**Infectious Map Challenge"** Map the geographical distribution of the given pathogen in the world map	5			
	4.	**Journal** Prepare and submit a journal of the practical given of the unit.	5			
	Total Marks		20	20		

Suggested Specification table with Marks:

Distribution of Theory Marks **(Revised Bloom's Taxonomy)**						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	10%	30%	20%	20%	10%	10%

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcome:

After learning the course, the students should be able to:	
CO1	Apply scientific classification principles to identify and differentiate invertebrate phyla (Protozoa to Aschelminths) based on characteristic features and examples.
CO2	Demonstrate knowledge of the anatomical organization of Hydra to understand the biological features of Coelenterates.
CO3	Develop conceptual linkages between anatomical complexity and phylogenetic progression within higher invertebrate phyla.
CO4	Interpret and describe earth worm anatomical systems (digestive, nervous, reproductive) through charts, models, and multimedia.
CO5	Analyze the life cycles and pathogenic characteristics of parthenogenic invertebrates such as *Entamoeba*, *Fasciola*, *Taenia*, *Ascaris*, and *Anopheles*.

Instructional Method:

The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

Reference Books:

1. Modern Text Book of Zoology(invertebrate) R.L. Kotpal
2. Text book of Zoology R. D. Vidyarthi
3. Economic Zoology G.S.Shukla & V.B.Upadhyay
4. Invertebrate Zoology E.L.Jordan & P.S.Verma
5. Animal Diversity. Cleveland P. Hickman, Larry S Roberts, Susan L.