

**Department of Higher Education, Govt. of M.P.**  
**Under Graduate Syllabus for B.Sc. (Bio)**  
**As recommended by Central board of Studies in Zoology**  
**Class - B.Sc. I year (Session 2021-22)**

<b>Theory Syllabus</b>			
<b>Part A Introduction</b>			
<b>Programme- Certificate Course</b>	<b>Class: B.Sc</b>	<b>Year: I Year</b>	<b>Session: 2021-2022</b>
Subject: Zoology			
1.	Course Code	S1-ZOOL1T	
	Course Title	Animal Diversity: Non-Chordata (Paper-1)	
	Course Type (Core Course/Elective/Generic Elective/Vocational.)	Core Course	
	Pre-requisite (if any)	To study this course a student must have had the subject Biology in 12 <sup>th</sup> Class	
	Course Learning outcomes (CLO)	Upon completion of the course students should be able to 1. Learn about the importance of systemic, taxonomy and phylogeny to get a concrete idea of evolution of non-chordate phyla. 2. Understand the various morphological, anatomical structures and functions of animals of different phyla. 3. Get the knowledge about economic, ecological and medical significance of various animals in human welfare. 4. Understand the important parasites and their control measures.	

## Part C-Learning Resources

### Text Books, Reference Books, Other resources

#### Suggested readings

1. Parker, J, Haswell, WA, "A Text Book of Zoology". VII edition, Vol. 1 & II, Low Price Publications, Delhi, 1990.
2. Barnes, RD, "Invertebrate Zoology", VII Edition, Cengage Learning, India, 2006.
3. Pechenik, JA, "Biology of the Invertebrates" McGraw-Hill Educations, VII Edition, 2015.
4. Sedgwick, A, "A Students Text Book of Zoology", Vol.I. II & Vol. III., Low Price Publications, Delhi, 1990.
5. Dhami and Dhami, "Invertebrate Zoology" R., Chand & Co., India, 2009.
6. Jordan and Verma, "Invertebrate Zoology," S. Chand & Company. New Delhi, 2013.
7. Agarwal, VK, "Zoology for Degree Students: Non-Chordata", S Chand & Company,2017.
8. Kotpal, R, "Modern Text Book of Invertebrates", Rastogi Publications, Meerut, 2017
9. Kotpal, R. "Protozoa to Echinodermata (Phylum Series)", Rastogi Publications, Meerut, 2017.
10. <https://zoologylearningpoint.wordpress.com>
11. <https://zoologyresources.com>

<b>Part B Content of the course</b>		
<b>Total No. of Lectures – Tutorials- Practical (in hours per week): 2hours per week</b>		
<b>L-T-P:</b>		
<b>Unit I</b>	<b>Topics</b>	<b>No. of Lectures</b>
I	<p><b>Taxonomy, Phylogeny and Protozoa</b></p> <p><b>1. Taxonomy</b></p> <p>1.1 Elementary Knowledge of Zoological Nomenclature and International Code</p> <p>1.2 Outline Classification of Animal Kingdom up to Phylum of acoelomate and coelomate non-chordates according to Parker and Haswell 7<sup>th</sup> edition</p> <p><b>2. Phylogeny</b></p> <p>2.1 Definition and Examples</p> <p><b>3. Protozoa</b></p> <p>3.1 Phylum Protozoa: General characters of the phylum and outline classification upto classes with distinctive characters and suitable examples</p> <p>3.2 Structure, life history and pathogenicity of malarial parasite (<i>Plasmodium vivax</i>)</p> <p>3.3 Protozoa and disease - Amoebiasis, Trypanosomiasis, Leishmaniasis &amp; Trichomoniasis</p> <p><b>Keywords/Tags:</b> ICZN, Classification, Protozoa, Plasmodium,</p>	11
II	<p><b>Porifera, Coelenterata</b></p> <p><b>1. Porifera</b></p> <p>1.1 Phylum Porifera: General characters of the phylum and outline classification up to classes with distinctive characters and suitable examples</p> <p>1.2 Type study of <i>Sycon</i> Morphology, Reproduction &amp; Development</p> <p>1.3 Canal system of Sponges</p> <p><b>2. Coelenterata</b></p> <p>2.1 Phylum Coelenterata: General characters of the phylum and outline classification up to classes with distinctive characters and suitable examples.</p> <p>2.2 Type Study of <i>Obelia</i> -Morphology, Life cycle</p> <p>2.3 Corals and Coral reef formation</p> <p><b>Keywords/Tags:</b> Classification, Porifera, <i>Sycon</i>, Coelenterata, <i>Obelia</i>, Coral reefs</p>	11
III	<p><b>Platyhelminthes, Nematelminthes, Annelida</b></p> <p><b>1. Platyhelminthes</b></p> <p>1.1 Phylum Platyhelminthes: General characters of the phylum and outline classification up to classes with distinctive characters and suitable examples</p> <p>1.2 External morphology and life history of Liver fluke</p> <p><b>2. Nematelminthes</b></p>	

	<p>2.1 Phylum Nematelminthes: General characters of the phylum and outline classification up to classes with distinctive characters and suitable examples.</p> <p>2.2 Pathogenic symptoms of Nematodes and diseases – Ascariasis , Trichuriasis, Enterobiasis, Filariasis &amp; Trichinosis (Trichinellosis)</p> <p><b>3. Annelida</b></p> <p>3.1 Phylum Annelida: General characters of the phylum and outline classification up to classes with distinctive characters and suitable examples</p> <p>3.2 Type study of Earthworm (<i>Pheretima</i>)</p> <p>3.3 Structure and significance of Trochophore larva</p> <p><b>Keywords/Tags:</b> Classification, Platyhelminthes, Liver fluke, Nematode disease, Annelida, <i>Pheretima</i>, Trochophore</p>	14
IV	<p><b>Arthropoda, Mollusca</b></p> <p><b>1. Arthropoda</b></p> <p>1.1 Phylum Arthropoda: General Characters of the phylum and outline classification up to classes with distinctive characters and suitable examples</p> <p>1.2 Type study of Prawn</p> <p>1.3 Larval forms of crustacea - Nauplius, Zoea, Megalopa &amp; Mysis larva.</p> <p>1.4 Insects as a vector of human disease - Culex, Aedes, <b>Tsetse fly &amp; Housefly.</b></p> <p><b>2. Mollusca</b></p> <p>2.1 Phylum Mollusca: General characters of the phylum and outline classification up to classes with distinctive characters and suitable examples</p> <p>2.2 Type study of <i>Pila</i></p> <p>2.3 Structure &amp; Significance of Glochidium larva</p> <p><b>Keywords/Tags:</b> Classification, Arthropoda, Prawn, Crustacea larva, Insects, Mollusca, <i>Pila</i>, Glochidium</p>	12
V	<p><b>Echinodermata, Hemichordata</b></p> <p><b>1. Echinodermata</b></p> <p>1.1 Phylum Echinodermata: General characters of the phylum and outline classification up to classes with distinctive characters and suitable examples</p> <p>1.2 External features and water vascular system of Starfish (<i>Asterias</i>)</p> <p>1.3 Larval forms of Echinodermata</p> <p><b>2. Hemichordata</b></p> <p>2.1 Phylum Hemichordata: General characters of the phylum hemichordate and relationship with non-chordates and chordates</p> <p>2.2. <i>Balanoglossus</i> - External morphology</p> <p>2.3 Structure and significance of Tornaria larva</p> <p><b>Keywords/Tags:</b> Classification, Echinodermata, <i>Asterias</i>, Echinodermata larvae, Hemichordata, <i>Balanoglossus</i>, Tornaria</p>	12

**Suggested equivalent online courses:**

## 1. Swayam Online Courses

<https://storage.googleapis.com/uniquecourses/online.html>

## 2. National Digital Library

<https://ndl.iitkgp.ac.in/>

3. e-PG Pathshala (MHRD) Portal(<https://epgp.in/libnet.ac.in/>)4. Animal diversity <https://swayam.gov.in/courses/5686/animal-diversity>

Advances in Animal Diversity, Systemics and Evolution

(<https://swayam.gov.in/courses/5686-zoology>)

## 5. Science Direct Open Access Content

(<https://www.sciencedirect.com/book/9781843342038/open-access>)

**Part D Assessment and Evaluation**

Suggested Continuous Evaluation Methods;

Maximum Marks 100

Continuous Comprehensive Evaluation (CCE): 25 Marks University Exam (UE): 75 Marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE): 25	Class Test Assignment/Presentation	15
		10
	Total	25
External Assessments: University Exam : 75  Time:2:00 Hours	Section (A): Three Very Short Questions (50 words Each)	03X03=9
	Section (B): Four Short Questions (200 words Each)	04x09=36
	Section (C): Two Long Questions (500 words Each)	02x15=30
	Total	75

**Any remarks/suggestions:**

Practical Syllabus			
Part A Introduction			
Programme: Certificate Course		Class: B.Sc	Year: I Year
Session: 2021-2022			
Subject: Zoology			
1.	Course Code	S1-ZOOL1P	
2.	Course Title	Invertebrate (Paper-1)	
3.	Course Type (Core Course/Elective/Generic Elective/Vocational/....)	Core Course	
4.	Pre-requisite (if any)	To study this course a student must have had the subject Biology in 12 <sup>th</sup> Class	
5.	Course Learning outcomes (CLO)	Upon completion of the course students should be able to 1. Identify invertebrate animals of different phyla and their histology through study of museum specimens and slides. 2. Learn their different systems through dissections. 3. Enhance collaborative learning and communication skills through practical sessions, team work, group discussions, assignments and projects.	
6.	Credit Value	2	
7.	Total Marks	Max. Marks: 25+75	Min. Passing Marks:33

Part B- Content of the Course		
Total No. of Lectures - Tutorials-Practical (in hours per week): 02 hours per week		
L-T-P:		
Unit	Topics	No. of lectures
1.	Study of museum specimens and slides relevant to the invertebrates.	25
2.	Dissection (Demonstration Only -Through You Tube Video or Models or Charts) a. Earthworm- Digestive system. Nervous system, Reproductive system b. Prawn-Nervous system and appendages c. Pila-Nervous System d. Cockroach-Digestive System, Nervous System (Easily available animal in residential areas which can be used for dissection and mounting)	12

3.	Mounting a. Locally available small non-chordates, their larvae  b. Mouth Parts of Insects – Cockroach/Mosquitoes	5
4.	Examination of pond water for study of different kinds of microscopic non-chordate organisms	8
5.	Economic Importance of any two invertebrates/ two Insects	5
6.	Parasitic Adaptation of any one parasite – Fasciola hepatica/Taenia solium	5
Keywords/Tags: Museum specimens, Slides, Dissection, Mounting, Benefited insects, parasitic adaptation.		

### **Part C-Learning Resources**

#### **Text Books, Reference Books, Other resources**

##### **Suggested Readings:**

1. Arumam, N. Nair, NC, Leelavathy, S. Pandian, NS, Murugan, T, Jayasurya, "Practical Zoology - Invertebrata", Volume-I. Saras Publication, 2013.
2. Lal, SS. "A Text book of Practical Zoology - Invertebrates", Rastogi Publication, 2016
3. Prakash, M, and Arora, CK. "Laboratory Animals". Anmol Publications, New Delhi, 1998
4. Verma, PS, "A Manual of Practical Zoology - Invertebrates". S. Chand & Co., 2013.
5. Virtual Labs (<https://www.vlab.co.in>)

<b>Part D Assessment and Evaluation</b>			
<b>Suggested Continuous Evaluation Methods:</b>			
<b>Internal Assessment</b>	<b>Marks</b>	<b>External Assessment Marks</b>	<b>Marks</b>
Class/Interaction/Quiz	10	Viva Voce on Practical	15
Attendance	05	Practical Record File	10
Assignments (Charts/Model/Seminar/Rural Service/Technology Dissemination/Report of Excursion/lab visits/Survey/Industrial visit)	10	Table work/ Experiments a. Spotting b. Dissection c. Mounting d. Examination of pond water e. Economic Importance of Insects f. Parasitic Adaptations	50 16 08 04 10 06 06
<b>Total</b>	<b>25</b>		<b>75</b>
<b>Any remarks/suggestions:</b>			