University of Rajasthan

Jaipur

SYLLABUS

(UG0802 Three/Four Year Undergraduate Programme)

(Bio Group)

Subject: Zoology

For B.Sc. Semester I to VI

(Academic Session 2025-26)

Name of University	University of Rajasthan, Jaipur
Name of Faculty	Science
Name of Discipline	ZOOLOGY
Type of Discipline	Major
List of Programme were offered as Minor Discipline	B.Sc. Chemistry: UG0804 B.Sc. Botany: UG0805
Offered to Non-Collegiate Students	Yes

SEMESTER-WISE PAPER TITLES WITH DETAILS

UG0802 – Three/Four Year B. Sc. (Bio Group)								
S. No.	**Level**	**Semester**	**Type**	**ZOOLOGY**	**Credits**			
				Title	**L**	**T**	**P**	**Total**
1.	5	I	MJR	**UG0802 -ZOO-51T-101-** Diversity & Biology of Non-Chordates	4	0	0	4
2.	5	I	MJR	**UG0802 -ZOO-51P-102-** Practicals based on Diversity & Biology of Non-Chordates	0	0	2	2
3.	5	II	MJR	**UG0802 -ZOO-52T-103-** Diversity of Chordates and Developmental Biology of Vertebrates	4	0	0	4
4.	5	II	MJR	**UG0802 -ZOO-52P-104-** Practicals based on Diversity of Chordates & Developmental Biology of Vertebrates	0	0	2	2
5.	6	III	MJR	**UG0802 -ZOO-63T-201-** Economic Zoology & Ethology	4	0	0	4

Signature of Dean	**Signature of BoS Convenor**	**Signature Of DR (Academic-II)**
		Dy. Registrar (Academic) University of Rajasthan JAIPUR

6.	6	III	MJR	**UG0802 -ZOO-63P-202-** Practicals based on Economic Zoology & Ethology	0	0	2	2
7.	6	IV	MJR	**UG0802 -ZOO-64T-203-** Cell Biology & Genetics, Biotechnology	4	0	0	4
8.	6	IV	MJR	**UG0802 -ZOO-64P-204-** Practicals based on Cell Biology & Genetics, Biotechnology	0	0	2	2
9.	7	V	MJR	**UG0802 -ZOO-75T-301-** Animal Physiology & Biochemistry	4	0	0	4
10.	7	V	MJR	**UG0802 -ZOO-75P-302-** Practicals based on Animal Physiology & Biochemistry	0	0	2	2
11.	7	VI	MJR	**UG0802 -ZOO-76T-303-** Microbiology, Immunology & Biostatistics	4	0	0	4
12.	7	VI	MJR	**UG0802 -ZOO-76P-304-** Practicals based on Microbiology, Immunology & Biostatistics	0	0	2	2

Examination Scheme:

CA: Continuous Assessment

EoSE: End of Semester Examination

1. 1 credit = 25 marks for examination/evaluation
2. For Regular Students there will be Continuous Assessment, in which sessional work and the terminal examination will contribute to the final grade. Each course in Semester Grade Point Average (SGPA) has two components- Continuous Assessment (20% weightage) and (End of semester examination) EoSE (80% weightage).
3. For Regular Students,75% Attendance is mandatory for appearing in the EoSE.

Signature of Dean	Signature of BoS Convenor	Signature Of DR (Academic-II)
		Dy. Registrar (Academic) University of Rajasthan JAIPUR

4. To appear in the EoSE examination of a Course/Subject a regular student must appear in the mid-semester examination and obtain at least a C grade in the Course/Subject.

5. Credit points in a Course/Subject will be assigned only if, the regular student obtains at least a C grade in the CA and EoSE examination of a Course/Subject.

6. In the case of Non-Collegiate students there will be no Continuous assessment and credit points in a Course/Subject will be assigned only if, the Non-Collegiate student obtains at least a C grade in the EoSE examination of a Course/Subject.

Signature of Dean	Signature of BoS Convenor	Signature Of DR (Academic-II)
		Dy. Registrar (Academic) University of Rajasthan JAIPUR

Examination Scheme for Continuous Assessment (CA):

DISTRIBUTION OF CONTINUOUS ASSESSMENT (CA) MARKS											
S. No.	CATEGORY	Weightage (out of total internal marks)		THEORY					PRACTICAL		
				CORE (Only Theory)	CORE (Theory + Practical)	AEC	SEC	VAC	CORE (Theory +Practical)	SEC	VAC
	Max Internal Marks			30	20	20	10	10	10	10	10
1	Mid-term Exam	50%		15	10	10	5	5	5	5	5
2	Assignment	25%		7.5	5	5	2.5	2.5	2.5	2.5	2.5
3	Attendance	25%		7.5	5	5	2.5	2.5	2.5	2.5	2.5
		Regular Class Attendance	= 75%	3	2	2	1	1	1	1	1
			75-80%	4	3	3	1.5	1.5	1.5	1.5	1.5
			80-85%	5	4	4	2	2	2	2	2
			> 85%	7.5	5	5	2.5	2.5	2.5	2.5	2.5

VAC: Value Added Course; AEC: Ability Enhancement Course; SEC: Skill Enhancement Course

Note:

1. Continuous Assessment will be the sole responsibility of the teacher concerned.
2. For Continuous Assessment no remuneration will be paid for paper setting, Evaluation, Invigilation etc.
3. For Continuous Assessment Paper setting and Evaluation responsibility will be of teacher concern.
4. For Continuous Assessment no Answer sheets/question papers etc. will be provided by the University.
5. Colleges are advised to keep records of CA, attendance etc.

Signature of Dean	Signature of BoS Convenor	Signature Of DR (Academic-II)
		Dy. Registrar (Academic) University of Rajasthan JAIPUR

Examination Scheme for EoSE:

Regular Students:

Type of Examination	Course Code and Nomenclature	Duration of Examination (Hrs)		Maximum Marks		Minimum Marks	
Theory	**UG0802 -ZOO-51T-101-** Diversity & Biology of Non-Chordates	CA	1	CA	20	CA	8
		EoSE	3	EoSE	80	EoSE	32
Practical	**UG0802 -ZOO-51P-102-** Practicals based on Diversity & Biology of Non-Chordates	CA	2	CA	10	CA	4
		EoSE	4	EoSE	40	EoSE	16
Theory	**UG0802 -ZOO-52T-103-** Diversity of Chordates & Developmental Biology of Vertebrates	CA	1	CA	20	CA	8
		EoSE	3	EoSE	80	EoSE	32
Practical	**UG0802 -ZOO-52P-104-** Practicals based on Diversity of Chordates & Developmental Biology of Vertebrates	CA	2	CA	10	CA	4
		EoSE	4	EoSE	40	EoSE	16
Theory	**UG0802 -ZOO-63T-201-** Economic Zoology & Ethology	CA	1	CA	20	CA	8
		EoSE	3	EoSE	80	EoSE	32
Practical	**UG0802 -ZOO-63P-202-** Practicals based on Economic Zoology & Ethology	CA	2	CA	10	CA	4
		EoSE	4	EoSE	40	EoSE	16
Theory	**UG0802 -ZOO-64T-203-** Cell Biology & Genetics, Biotechnology	CA	1	CA	20	CA	8
		EoSE	3	EoSE	80	EoSE	32
Practical	**UG0802 -ZOO-64P-204-** Practicals based on Cell Biology &Genetics, Biotechnology	CA	2	CA	10	CA	4
		EoSE	4	EoSE	40	EoSE	16
Theory	**UG0802 -ZOO-75T-301-** Animal Physiology & Biochemistry	CA	1	CA	20	CA	8
		EoSE	3	EoSE	80	EoSE	32

Signature of Dean	Signature of BoS Convenor	Signature Of DR (Academic-II)
		Dy. Registrar (Academic) University of Rajasthan JAIPUR

Practical	**UG0802 -ZOO-75P-302-** Practicals based on Animal Physiology & Biochemistry	CA	2	CA	10	CA	4
		EoSE	4	EoSE	40	EoSE	16
Theory	**UG0802 -ZOO-76T-303-** Microbiology, Immunology & Biostatistics	CA	1	CA	20	CA	8
		EoSE	3	EoSE	80	EoSE	32
Practical	**UG0802 -ZOO-76P-304-** Practicals based on Microbiology, Immunology & Biostatistics	CA	2	CA	10	CA	4
		EoSE	4	EoSE	40	EoSE	16

The Theory question paper will consist of **two** parts **A** & **B**.

PART-A: 20 Marks

Part A will be compulsory having 10 very short answer-type questions (with a limit of 20 words) of two marks each.

PART-B: 60 Marks

Part B of the question paper shall be divided into four units comprising question numbers 2-5. There will be one question from each unit with internal choice. Each question will carry 15 marks.

For **Practical Examination**, the scheme is provided with the detailed syllabus of concerned course.

Non-Collegiate Students:

Type	Course Code and Nomenclature	Duration of Examination (Hrs)	Maximum Marks (EoSE)	Minimum Marks (EoSE)
Theory	**UG0802 -ZOO-51T-101-** Diversity & Biology of Non-Chordates	3	100	40
Practical	**UG0802 -ZOO-51P-102-** Practicals based on Diversity & Biology of Non-Chordates	4	50	20
Theory	**UG0802 -ZOO-52T-103-** Diversity of Chordates &	3	100	40

Signature of Dean	Signature of BoS Convenor	Signature Of DR (Academic-II)
		Dy. Registrar (Academic) University of Rajasthan JAIPUR

	Developmental Biology of Vertebrates			
Practical	**UG0802 -ZOO-52P-104-** Practicals based on Diversity of Chordates & Developmental Biology of Vertebrates	4	50	20
Theory	**UG0802 -ZOO-63T-201-** Economic Zoology & Ethology	3	100	40
Practical	**UG0802 -ZOO-63P-202-** Practicals based on Economic Zoology & Ethology	4	50	20
Theory	**UG0802 -ZOO-64T-203-** Cell Biology, Genetics & Biotechnology	3	100	40
Practical	**UG0802 -ZOO-64P-204-** Practicals based on Cell Biology, Genetics & Biotechnology	4	50	20
Theory	**UG0802 -ZOO-75T-301-** Animal Physiology & Biochemistry	3	100	40
Practical	**UG0802 -ZOO-75P-302-** Practicals based on Animal Physiology & Biochemistry	4	50	20
Theory	**UG0802 -ZOO-76T-303-** Microbiology, Immunology & Biostatistics	3	100	40
Practical	**UG0802 -ZOO-76P-304-** Practicals based on Microbiology, Immunology & Biostatistics	4	50	20

The Theory question paper will consist of **two** parts **A** & **B**.

PART-A: 20 Marks

Part A will be compulsory having 10 very short answer-type questions (with a limit of 20 words) of two marks each.

PART-B: 80 Marks

Signature of Dean	Signature of BoS Convenor	Signature Of DR (Academic-II)
		Dy. Registrar (Academic) University of Rajasthan JAIPUR

Part B of the question paper shall be divided into four units comprising question numbers 2-5. There will be one question from each unit with internal choice. Each question will carry 20 marks.

For **Practical Examination**, the scheme is provided with the detailed syllabus of concerned course.

Signature of Dean	Signature of BoS Convenor	Signature Of DR (Academic-II)
		Dy. Registrar (Academic) University of Rajasthan JAIPUR

Program Outcomes (POs):

PO1: Knowledge: Students will gain a comprehensive understanding in fundamental and applied Zoology, covering topics such as Evolution, Behavior, Physiology, Molecular Biology, Genetics, Cell and Molecular Biology, and Environmental Biology.

PO2: Problem Analysis: Develop and maintain rational thinking to address complex problem-solving and analytical tasks related to core and applied zoology issues.

PO3: Usage of Advanced Techniques: Acquire, choose, and implement traditional taxonomy, practical field skills, and contemporary molecular laboratory techniques. Achieve proficiency in using research facilities and operate safely in a lab environment, both independently and as part of a team.

PO4: Planning Abilities: Cultivate effective planning skills, including time management, analytical abilities, and decision-making to achieve attainable objectives.

PO5: Leadership Skills: Foster leadership abilities to collaborate in a team and take initiative to meet professional and societal duties.

PO6: Animal Ethics: Develop compassion and affection towards animals. Apply animal ethics principles and commit to professional and social responsibilities.

Program Specific Outcomes (PSOs):

Communication: Enhance reasoning and communication skills with both the scientific community and society. Synthesize information from literature and communicate it through scientific papers, reports, posters, and oral presentations.

Contribution to Society: Make contributions to society in areas such as the environment, agriculture, natural resource management, and human and animal health and well-being.

Professional Identity: Recognize, assess, and convey the significance of their professional roles in various analytical and forensic laboratories, Zoological Survey of India, archaeology, wildlife management, aquaculture, and food processing sectors.

Environment and Sustainability: Utilize zoological research to promote sustainable development programs for the conservation and preservation of biodiversity.

Signature of Dean	Signature of BoS Convenor	Signature Of DR (Academic-II)
		Dy. Registrar (Academic) University of Rajasthan JAIPUR

Life-long Learning: Encourage independent, critical, and creative thinking in students for lifelong learning.

Signature of Dean	Signature of BoS Convenor	Signature Of DR (Academic-II)
		Dy. Registrar (Academic) University of Rajasthan JAIPUR

Detailed Syllabus

UG0802 - ZOO- 51T-101- Diversity & Biology of Non-Chordates

UG0802 -ZOO-51P-102- Practicals based on Diversity & Biology of Non-Chordates

I Semester -Zoology

Semester	Code of the Course	Title of the Course/Paper				NHEQF Level	Credits
I	ZOO- 51T-101 ZOO-51P-102	Diversity & Biology of Non-Chordates Practicals based on Diversity & Biology of Non-Chordates				5	6
Level of Course	Type of the Course	Credit Distribution			Offered to NC Student	Course Delivery Method	
		Theory	Practical	Total			
5	Major	4	2	6	Yes	Lectures: 60 lectures including diagnostic and informative assessments during lecture hours and 30 Hours of Practical training/demonstration.	
List of Programme Codes in which Offered as Minor Discipline		B.Sc. Chemistry: UG0804 B.Sc. Botany: UG0805					
Prerequisites		XII Pass					
Objectives of the Course:		• The main purpose of introducing this course is to teach the students the Morpho-taxonomy, and evolutionary relationships among and between non-chordates and chordates along with creating awareness and concern towards the importance of animal diversity for human survival and its socioeconomic significance. • In addition to this, the course is aimed at nurturing skills of conducting scientific inquiry and experimentation in the field of animal diversity to acquire knowledge of fundamental concepts and theories of animal diversity.					

Signature of Dean	Signature of BoS Convenor	Signature Of DR (Academic-II)
		Dy. Registrar (Academic) University of Rajasthan JAIPUR

Detailed Syllabus

ZOO- 51T-101: Diversity & Biology of Non -Chordates

UNIT-I

Principles of taxonomy: International code of zoological nomenclature (ICZN); Concept of five kingdom system; basis of classification: symmetry, coelom, segmentation, embryogeny and levels of organization **3 Hrs**

Protozoa: General characteristics and classification up to classes; Habit, Habitat, Morphology, locomotion, nutrition, reproduction and economic importance of protozoa: *Paramecium* **6 Hrs**

Porifera: General characteristics and Classification up to classes; Canal system in Porifera; Habit, Habitat, Morphology, reproduction, regeneration and economic importance of sponges and life cycle: *Sycon* **6Hrs**

UNIT-II

Coelenterata (Cnidaria): General characteristics and Classification up to classes; Polymorphism; Coral reefs and their economic importance, Habit, Habitat, Morphology, reproduction and life cycle: *Obelia.* **7 Hrs**

Platyhelminthes and Nemathelminthes: General characteristics and Classification up to classes; parasitic adaptations, phylogenetic significance of flatworms; Habit, Habitat, morphology, organ systems: digestive, circulatory, excretory, nervous, reproductive and life cycle of *Taenia* and *Ascaris* **8 Hrs**

UNIT-III

Annelida: General characteristics and Classification up to classes; Habit, Habitat, Morphology, organ systems: locomotion, digestive, circulatory, excretory, nervous, reproduction and life cycle: *Neanthes (Nereis).* **6Hrs**

Arthropoda: General characteristics and Classification up to classes; Larval forms in crustacea, Metamorphosis and Social organization in insects; Habit, Habitat, Morphology, organ systems: digestive, circulatory, excretory, nervous, reproductive and life cycle: Prawn **7 Hrs**

Onycophora: General characteristics and classification; phylogenetics of *Peripatus*

Signature of Dean	Signature of BoS Convenor	Signature Of DR (Academic-II)
		Dy. Registrar (Academic) University of Rajasthan JAIPUR

2 Hrs

UNIT-IV

Mollusca: General characteristics and Classification up to classes; Torsion in Gastropoda; Pearl formation. Habit, Habitat, Morphology, organ systems: locomotion, digestive, circulatory, excretory, reproductive and life cycle: *Pila.* **7 Hrs**

Echinodermata: General characteristics and Classification up to classes; Water-vascular system in Asteroidea; Habit, Habitat, Morphology, organ system: digestive, circulatory, excretory, reproductive and life cycle: *Asterias.* **4 Hrs**

Hemichordata: General characteristics, Affinities with Chordata and Echinodermata, Systemic position and Phylogeny; *Balanoglossus*: Habit, habitat, morphology and life cycle **4 Hrs**

Suggested Books and References:

1. Invertebrate Zoology. VII Edition, Barnes, R.D. (2006) Cengage Learning, India.
2. The Invertebrates: A New Synthesis. III Edition, Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. and Spicer, J.I. (2002) Blackwell Science
3. Invertebrate Zoology. Jordan E.L., Verma P. S. (2022): S. Chand and Company Limited.
4. Invertebrate Structure and Functions. II Edition Barrington, E.J.W. (2012), EWP Publishers
5. Invertebrate Zoology: A Functional Evolutionary Approach. VII Edition, Ruppert, E.E., Fox, R.S., Barnes, R. D. (2003) Cengage Learning, India
6. Biology of the Invertebrates. VII Edition, Pechenik, J. A. (2015) Mraw-Hill Education
7. Biodiversity, Mali, P. C., Singh, M., Kumari, V. and Digarwal, G. L. (2023) (Animal Diversity-B.Sc I Semester). Neelkanth Publishers (P) Ltd.

Suggested E-roesources:

1. Kachhwaha, N and Kaushik, P (2019): Freely online available gaming websiteinnovativezoology.com to study vertebrate and invertebrate classification.

Signature of Dean	Signature of BoS Convenor	Signature Of DR (Academic-II)
		Dy. Registrar (Academic) University of Rajasthan JAIPUR

Course Learning Outcome:

Upon completion of the course, students will have knowledge of:

- Morpho-taxonomy and structural organization of non-chordata and chordata groups.
- Diversity of non-chordata and chordata groups.
- Evolutionary relationships and phylogeny of non-chordates and chordates through functional and structural similarities.
- Economic importance of non-chordates and chordates and their significance in the ecosystem.

Practical Syllabus

UG0802 -ZOO-51P-102- Practicals based on Diversity & Biology of Non-Chordates

1. Organization and working of Optical Microscope: Dissecting and compound microscopes.
2. General methods of microscopic slide preparations: Narcotization; fixing and preservation; washing; staining; destaining; dehydration; clearing and mounting.
3. General idea of composition, preparation and use of:
   i. Fixatives: Formalin, Bouin's fluid.
   ii. Stains: Aceto-carmine, Aceto-orcein, Haematoxylin, Eosin.
   iii. Common reagents: Normal saline, Acid water, Acid alcohol and Mayer's albumin.
4. Study of Microscopic Slides and Museum Specimens:
   i. Protozoa: *Euglena, Amoeba, Plasmodium, Paramecium* (W.M.), binary fission, and conjugation in *Paramecium*.
   ii. Porifera: *Leucosolenia, Euplectella, Spongilla, sycon*
   iii. Coelenterata: Millipora, *Physalia, Aurelia, Velella,* Sea anemone, *Gorgonia*, Stone corals.
   iv. Platyhelminthes: *Taenia* (WM*),* Cysticercus larva, *Fasciola* (WM), Miracidium, Sporocyst, Redia, Cercaria and Metacercaria Larvae of *Fasciola.*
   v. Aschelminthes: *Ascaris*

Signature of Dean	Signature of BoS Convenor	Signature Of DR (Academic-II)
		Dy. Registrar (Academic) University of Rajasthan JAIPUR

vi. Annelida: Neanthes*(Nereis), Aphrodite, Pontobdella, Arenicola, Glossiphonia, Hirudinaria.*

vii. Onychophora: *Peripatus*

viii. Arthropoda: *Limulus,* Scorpion, Centipede, Millipede, *Lepas,* Crab**,** *Mantis, Pediculus,* Termite, *Cyclops, Daphnia,* crustacean larvae (Nauplius, Zoea, Mysis, Megalopa),

ix. Mollusca: *Chiton, Aplysia, Dentalium, Cypraea, Mytilus, Loligo, Octopus, Nautilus.* Glochidium larva

x. Echinodermata: *Asterias, Antendon.*

xi. Hemichordata*: Balanoglossus*

5. Anatomy:
   i Earthworm: External features, nervous system, digestive system and reproductive system
   ii Pila: External features and nervous system.
   iii. Prawn: External features, appendages, alimentary canal, and nervous system.

6. Study of the following through Permanent Slide Preparation: *Euglena*, *Paramecium*, Sponge spicules, Gemmule, *Obelia* colony, Statocyst and hastate plate of prawn, osphradium and gill lamella of *Pila,* setae and septal nephridia of earthworm

7. Education tour and report preparation on the study of local invertebrate fauna

Scheme of Practical Examination and Distribution of Marks

S.No.	Practical Exercise	Regular Students	Ex. /N.C. Students
1.	Major exercise	**6**	**12**
2.	Minor exercise	**4**	**6**
3.	Permanent slide preparation	**4**	**6**
3.	Identification and comments on Spots (1 to 8)	**16**	**16**
4.	Viva Voce	**5**	**10**
5.	Class Record	**5**	
		10*+40=50	**50**

Signature of Dean	Signature of BoS Convenor	Signature Of DR (Academic-II)
		Dy. Registrar (Academic) University of Rajasthan JAIPUR

Note:

***Internal marks for regular students only.**

1. Anatomy: Study of systems of the prescribed types with the help of dissection. Detailed charts/Dissection softwares/virtual tools/models can also be utilized to study anatomy.
2. With reference to microscopic slides, in case of non-availability, the exercise should be substituted with diagrams / photographs.
3. Candidates must keep a record of all work done in the practical class and submit the same for inspection at the time of the practical examination.
4. Mounting material for permanent preparations would be as per the syllabus or as available through collection and culture methods.
5. It should be ensured that animals used in the practical exercises are not covered under the wild life act 1972 and amendments made subsequently.

Signature of Dean	Signature of BoS Convenor	Signature Of DR (Academic-II)