



# Syllabus

## Second Semester Courses in Zoology

### 2023-2024

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PRINCIPAL  
ST. XAVIER'S COLLEGE  
AUTONOMOUS  
MUMBAI - 400 001.



**APPROVED SYLLABUS**

**08 APR 2023**

**F.Y. B.Sc. ZOOLOGY**

**Course Title: Animal Diversity**

**Course Code: USZOO4502CR1**

**Credits 4: Theory (3) = Total 45 hr and Practical (1) = Total 30 hr**

**Prerequisite: None**

**(Conditions for completion of the course: Two out of three prescribed field trips are mandatory)**

**Course Objectives:**

1. Diversity in animals ranges from diversity in their distribution on the planet to the variety in their structure and function right down to the molecular level. Evolution has shaped the patterns in this diversity at all these levels. In the current course we introduce the students to classification and zoogeography, two ways one can look at the patterns in animal diversity.
2. To introduce students to classification of animals by giving a brief idea of the need for classification, history of classification and logic for classification i.e. evolutionary history.
3. To make students know characteristics of the different invertebrates and vertebrates from the animal kingdom and how to use classification keys.
4. To get the students familiarized with the patterns in diversity of animals on the planet i.e zoogeography.

**Course Outcomes:**

<b>CO</b>	<b>On completion of the course the learner should be able to:</b>	<b>Bloom's Taxonomy Level</b>
1.	Identify and classify various animal specimens in their respective phyla and other taxonomic classes based on morphological characteristics.	Remembering
2.	Understand the connection between classification and evolution.	Understanding
3.	Develop an understanding of zoogeography (the patterns of diversity of animals on the planet) and its applications.	Applying

**UNIT 1: Introduction of patterns in animal diversity**

(15 lectures)

- Levels of diversity and branches of biology that study these levels
- Zoogeography:
  - Zoogeographical realms, laws of distribution, factors inducing expansion, dispersal, migration and repression.
  - Faunal distribution types (continuous, disjunct, endemic) and abiotic and biotic factors affecting them.
  - Change in landmasses on the planet over time and its effect on zoogeography: theory of land bridges (include Palk strait), mass extinction and re-establishment of biodiversity.
  - Applications of zoogeography: Applications in species reintroduction, ecology and conservation (introduce them to conservation status), understanding lessepsian migration.
- Introduction to classification - History of animal classification, use of knowledge of classification, different types of classification systems, Current trends in classification (including Molecular Phylogeny)

**UNIT 2: Invertebrate Classification**

(15 lectures)

- Salient features of the different Phyla: (with example of one animal each based on teacher's discretion)
  - Phylum Protozoa
  - Phylum Porifera
  - Phylum Coelenterata / Cnidaria
  - Phylum Platyhelminthes
  - Phylum Nematoda
  - Phylum Annelida
  - Phylum Arthropoda
  - Phylum Mollusca
  - Phylum Echinodermata

### **UNIT 3: Vertebrate Classification**

(15 lectures)

Salient features of vertebrates:

- Phylum Hemichordata
- Phylum Chordata
  - Subphylum Urochordata
  - Subphylum Cephalochordata
  - Subphylum Vertebrata
- ❖ Superclass: Agnatha
  - Class Cyclostomata
- ❖ Superclass: Gnathostomata
  - Class Pisces
  - Class Amphibia
  - Class Reptilia
  - Class Aves
  - Class Mammalia – Prototheria, Metatheria, Eutheria and Marine Mammals

#### **Recommended References:**

1. Mader, S. and Windelspecht, M. (2021). Biology (14th ed.). McGraw Hill.
2. Kotpal, R.L. (2020). Modern Textbook of Zoology: Vertebrates (4th ed.). Rastogi Publications
3. Cox, C.B., Ladle, R.J. and Moore, P.D. (2020). Biogeography: An Ecological and Evolutionary approach (10th ed.). John Wiley and Sons Ltd.
4. Urry, L., Cain, M., Wasserman, S., Minorsky, P. and Reece, J. (2017). Campbell Biology (11th ed). Pearson Publication
5. Darlington, P.J. (2017). Zoogeography: The geographical distribution of animals. Academic Publishers.
6. Jordan, E.L. and Verma, P.S. (2013). Chordate Zoology (14th ed.). S. Chand and Company Ltd.
7. Miller, J. and Levine, J. (2010). Miller and Levine Biology. Pearson Prentice Hall
8. Jordan, E.L. and Verma, P.S. (2009). Invertebrate Zoology (15th ed.). S. Chand and Company Ltd.
9. Dhama, J.K. and Dhama, P.S. (1979). Invertebrate Zoology. R. Chand & Company.
10. Kotpal, R.L. (2020). Modern Textbook of Zoology: Invertebrates (12th ed.). Rastogi Publications.
11. Dhama, J.K. and Dhama, P.S. (1979). Chordate Zoology
12. Huxley, J. (1974). The Atlas of World Wildlife. Mitchell Beazley Publishers Limited.

**Practical Course:**

1. Study of distinctive fauna of the zoogeographical realm.
2. Study of change in land masses over time.
3. Study of chronostratigraphic charts.
4. **Invertebrate classification (using a simple identification key)**

Protozoa:	Amoeba, Euglena, Paramoecium,
Porifera:	Leucosolenia, bath sponge, hyalonema (glass rope sponge)
Coelenterata:	Hydra, Obelia colony, Aurelia, Fungia
Platyhelminthes:	Planaria, Liver fluke, Tapeworm
Nematoda:	Ascaris (male and female)
Annelida:	Earthworm, Leech, Nereis
Arthropoda:	Crab, lobster, Lepisma, beetle, dragonfly, butterfly, spider, centipede, millipede
Mollusca:	Chiton, Dentalium, Pila, bivalve, Sepia, Nautilus
Echinodermata:	Starfish, brittle star, sea urchin, sea cucumber, feather star

5. Mounting of Setae of earthworm and spicules from Sponge
6. Study of types of shells and foot in Mollusca
7. Identification of foraminifera shells

8. **Vertebrate classification: (using a simple identification key)**

Hemichordata:	Balanoglossus
Urochordata:	Ascidia, Herdmania
Cephalochordata:	Amphioxus
Cyclostomata:	Petromyzon, Myxine
Pisces:	Chondrichthyes – Shark, electric ray Osteichthyes – Flying fish, Puffer fish and Sea horse
Amphibia:	Frog, toad, Caecilian, salamander, Siren
Reptilia:	Chameleon, Calotes/Gecko, turtle, tortoise, snake, crocodile, Phrynosoma
Aves:	Kite, duck, Owl
Mammalia:	Hedgehog, Bat, Guinea pig and Marine Mammals (Dugong, Blue Whale, Dolphin)

**Field Trip:** Students attend two out of three field trips:

- One of the two Sea shore walks: two shore walks of different habitats will be conducted, and the students must attend AT LEAST one of the two and submit a field report.
- One walk for terrestrial animals in parks/zoos/wildlife sanctuaries/ in and around Mumbai: this is a COMPULSORY field trip and students submit a field report.

**Evaluation (Theory): Total marks per course - 100**

**I. Formative Assessment ‘for’ Learning (continuous internal assessment - CIA to improve learning).**

CIA – 40 marks:

- CIA 1: Written Test – 20 marks
- CIA 2: Multiple choice questions / Short Answers / Assignments / Presentation - 20 marks

**II. Summative Assessment ‘of’ Learning**

End Semester Examination – 60 marks.

- One question from each unit for 20 marks, with internal choice. Total marks per question with choice – 30 or more.

**Evaluation of (Practical:) Total marks Practical course - 50**

- End Semester Practical Examination (Identification, performance of experiments), submission of field reports / additional identification or experiment and submission of certified Journal – 50 marks.

**Template for the Core course End Semester examination in Semester II for the Core course in Animal Diversity**

UNITS	REMEMBERING	UNDERSTANDING	APPLYING	TOTAL MARKS Per unit
1	10	6	4	20
2	12	6	2	20
3	12	6	2	20
<b>TOTAL</b>	34	18	8	60
<b>% WEIGHTAGE</b>	56.7	30	13.3	100%

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F.Y.B.Sc. ZOOLOGY

**Course Title: Biotechniques**

**Course Code: USZOO4501VS1**

Credits 3: **Theory (1) = Total 15 hr and Practical (1) = Total 30 hr**

Prerequisite: **None**

**Course Objectives:**

1. To introduce the students to good laboratory practices.
2. To introduce the students to commonly used instruments and techniques in biology.
3. To teach the students the working principles, functioning and uses of these instruments and techniques.
4. To give the students hands-on training in handling these instruments and techniques.

**Course Outcomes:**

<b>CO</b>	<b>On completion of the course the learner should be able to</b>	<b>Bloom's Taxonomy Level (BT level)</b>
1	Know and remember good laboratory practices.	Remembering
2	Know the working principles, functions and uses of commonly used instruments and techniques in biology laboratories.	Understanding
3	Handle/Use these instruments and techniques.	Applying
4	Perform experiments and data analysis	Analysing

## **UNIT 1: Biotechniques – Theory**

(15 Lectures)

- Pipetting techniques - Principle, functioning and use: of Pipettes (regular and Micropipettes),
- Weighing Balance, Autoclaves (Dry heat & Steam Sterilization) and Biosafety Cabinet. (1 hours)
- Usage and tips on Water Bath, Incubator
- Concept of Molarity, Normality, Serial Dilution, ppm, ppb. Concept of stock solution and working solutions
- pH meter - pH theory, Electrode types and handling, Calibration of pH electrode
- Spectrophotometry - Introduction to Spectrophotometry and BL law, Colorimeter and Spectrophotometer Design,
- Microscopy - Working, Principle and Introduction to Dissection microscope, Light microscope, Stereomicroscope, Darkfield and Phase contrast microscope.
- Good laboratory practices and Globally Harmonized Systems.

## **Basic biotechniques - Laboratory Skills**

**(15 lectures)**

1. Use of Pipettes - Micropipettes and glass pipetting. Measuring Pipetting Accuracy.
2. Use of Weighing Balance - Operational use and basic weighing technique
3. Application of Autoclave and Dry heat Sterilization methods in Sterilization of plasticware, Glassware and biological materials.
4. Operation of a Biosafety Type II A Cabinet
5. Making laboratory solutions of a given Molarity, Normality. Performing serial dilutions. Diluting a given solution to a fixed part per (thousand, million, billion). Preparing a Stock solution and a working Solution for the same.
6. pH measurement of daily use household chemicals, Acid base Titrations
7. Spectrophotometry - Finding Lambda max for coloured solutions, Protein/glucose concentration estimation assay.
8. Microscope - preparation of slide, dry and wet mounts, Microscope handling techniques.
9. Use of Haematology analyser to assess blood samples.



