



Syllabus for

Four Years Undergraduate Program (FYUGP)

(FYUGP 1ST, 2ND & 3RD)

Prepared by-

Department of Zoology

Morigaon College

Course Structure

Semester-1			Semester-2		
Type	Course	Credit	Type	Course	Credit
Major	Paper: Diversity of Non-chordates	3(T)+1(P)=4	Major	Paper: Diversity of Chordates	3(T)+1(P)=4
Minor/ 2 Minor	Paper: Diversity of Non-chordates	3(T)+1(P)=4	Minor/ 2 Minor	Paper: Diversity of Chordates	3(T)+1(P)=4
Semester-3			Semester-4		
Major	Animal Taxonomy, Systematics & Biostatistics	3(T)+1(P)=4	Major	Animal Physiology & Endocrinology	3(T)+1(P)=4
	Principles of Ecology & Wildlife Management	3(T)+1(P)=4		Principles of Genetics	3(T)+1(P)=4
Minor	Principles of Ecology & Wildlife Management	3(T)+1(P)=4		Comparative anatomy of vertebrates	3(T)+1(P)=4
2 Minor	Animal Taxonomy, Systematics & Biostatistics	3(T)+1(P)=4		Animal behaviour and evolution	3(T)+1(P)=4
-	Principles of Ecology & Wildlife Management	3(T)+1(P)=4	Minor	Comparative anatomy of vertebrates	3(T)+1(P)=4
-	-	-	2 Minor	Comparative anatomy of vertebrates	3(T)+1(P)=4
-	-	-		Animal Behaviour and Evolution	3(T)+1(P)=4
Semester -5			Semester-6		
Major	Fundamental of Biochemistry	3(T)+1(P)=4	Major	Developmental Biology & Reproductive biology	3(T)+1(P)=4
	Cell Biology	3(T)+1(P)=4		Molecular Biology & Computational Biology	3(T)+1(P)=4
	Immunology and Parasitology	3(T)+1(P)=4		Entomology & Fisheries	3(T)+1(P)=4
Minor	Cell Biology	3(T)+1(P)=4		Dissertation	4
2 Minor	Cell Biology	3(T)+1(P)=4	Minor	Entomology & Fisheries	3(T)+1(P)=4
	Immunology and Parasitology	3(T)+1(P)=4	2 Minor	Entomology & Fisheries	3(T)+1(P)=4
Internship	Internship	4		Developmental Biology & Reproductive biology	3(T)+1(P)=4

Semester 1

Major 1

Paper: Diversity of Non-Chordates

Course Code: ZLG-CORE-(MJ/MN)-MC-0100104

Credit: 3(T)+1(P)

Course Objective:

This course aims to provide students with a comprehensive understanding of major invertebrate phyla, beginning with Protista and progressing through Porifera, Cnidaria, Ctenophora, Helminthes, Annelida, Arthropoda, Onychophora, Mollusca, and Echinodermata. It highlights their general characteristics, classification, evolutionary trends, and functional biology. Students will explore key concepts such as locomotion, reproduction, polymorphism, parasitic adaptations, coelom evolution, segmentation, sensory systems, torsion, and water vascular mechanisms. The course emphasizes comparative study to build insight into structural diversity, ecological roles, and evolutionary significance of invertebrates, laying a strong foundation for advanced zoological learning.

Learning outcomes:

1. Gain knowledge of systematics, taxonomy, and the basic structural organization of animals.
2. Understand the wide diversity of non-chordates found in different habitats and ecological conditions.
3. Interpret the evolutionary background and relationships among various non-chordate groups based on their structural and functional features.
4. Evaluate the body organization, levels of complexity, and defining characteristics of non-chordates, enabling students to become familiar with the morphology and anatomy of key representatives from different phyla.
5. Recognize the ecological and economic significance of non-chordates, along with their environmental interactions and contributions to ecosystems.

THEORY

Hours

Unit 1: Protista

4

General characteristics and Classification up to order of Protista, Locomotion and Reproduction in Protista

Unit 2: Porifera

4

General characteristics and Classification up to order of Porifera, Canal system and spicules in sponges

Unit 3: Cnidaria & Ctenophora	5
General characteristics and Classification up to order of Cnidaria & Ctenophora, Polymorphism in Cnidaria, Corals and coral reef formation	
Unit 4: Helminthes	5
General characteristics and Classification up to order of Platyhelminthes & Nematelminthes, Parasitic adaptations in helminths- <i>Fasciola hepatica</i> and <i>Wuchereria bancrofti</i>	
Unit 5: Annelida	8
General characteristics and Classification up to order of Annelida, Evolution of coelom and metamerism, Evolution of symmetry and segmentation of Metazoa, , Excretion in Annelida	
Unit 6: Arthropoda	5
General characteristics and Classification up to order of Arthropoda: Insecta (Lepidoptera, Choleoptera,Hymenoptera, Orthoptera, Isoptera, Diptera, Odonata, Anoplura,Siphonoptera); Crustacea(Diplostraca, Podocopa); Arachnida(Araneae, Acarina); Myriapoda (Diplopoda,Chilopoda), Digestive system of Arthropoda.	
Unit 7: Onychophora	2
General Characteristics and evolutionary significance of Onychophora.	
Unit 8: Mollusca	6
General characteristics and Classification up to order of Mollusca, Pearl formation in bivalves, Torsion and detorsion in Gastropoda, Market value and productivity of Mollusca in regional context.	
Unit 9: Echinodemata	6
General characteristics and Classification up to classes of Echinodermata, Water vascular system of Echinodermata.	
Unit 10: Hemichordata	
General characteristics and classification of Hemichordata, larval forms of hemichordata, Morphology and Affinities of Balanoglossus.	

1. Study of the whole mount of *Euglena*, *Amoeba* and *Paramecium*
2. Study of minimum of two representatives (specimen/slide/model) of each phylum of non-chordates.
3. Dissection of digestive and nervous system of cockroach
4. Study of larval forms of Arthropoda/Echinodermata
5. T.S. through pharynx, gizzard and typhlosolar intestine of earthworm.
6. To submit a Project Report on life cycle of helminth parasite by students

Suggested Readings:

1. Sheikh, M.S (2023). Zoology-I; Diversity of Non-Chordates, 1st Edition, Ashok Publication
2. Mahanta, R and Bhattacharyya, I.K (2024). Diversity of non-chordates, 1st Edition, Kalyan Publication.
3. Raj, M. (2021). Animal Diversity, Ashok Book Stall
4. Ruppert, E.E. and Barnes, R.D. (2006). Invertebrate Zoology, 8th Edition. Holt Saunders International Edition.
5. Pechenik, J. (2015). Biology of the Invertebrates. 7th Edition, McGraw Hill
6. Schierwater, B. & DeSalle, R. (2021). Invertebrate Zoology: A Tree of Life Approach. 1st edition, CRC Press
7. Jordan, K. and P. S. Verma (2019). Invertebrate Zoology, S. Chand and Co. Ltd.
8. Kotpal, R. L. (2020). Modern text book of Zoology, Invertebrates, 12th Edition, Rastogi Publications

Semester 1

Skill Enhancement Course

Course Title: Apiculture

Course Code: SEC-ZLG-MC-0100103

Total Marks: 75

Credit: 3 [2(T) + 1(P)]

Course Objectives

Apiculture is the scientific method of rearing or management of colonies of honey bees for obtaining honey and other bee products as well as getting pollination services. Bee keeping covers entomology, horticulture, agriculture, animal husbandry, forestry etc. This field bears tremendous potential of generating sustainable livelihood as the honey bee products has high market value in medicinal, pharmaceutical, cosmetics, food industries etc. The objectives of the course are to impart knowledge of biology, rearing techniques, diseases and enemies of bees, prospects of the field to venture in entrepreneurship development by their own or to pursue higher studies in the field.

Course Learning Outcome

- Understand the biology and rearing methods, tools and techniques of honey bees.
- Acquire practical skill of identifying stages of honey bees, structure of bee hives etc.
- Understand the value and economics of honey bee products in the market.
- Develop curiosity to venture in the field as entrepreneur or to pursue research in future.

Theory (Credit: 2, Hours: 30)

Unit 1: Biology of Bees, Diseases and Enemies (12 h)

Types and Biology of HoneyBees, Social Organization of Bee Colony, Bee Diseases and Enemies, Control and Preventive measures.

Unit 2: Rearing of Bees (12 h)

Artificial Bee rearing (Apiary), Beehives – Newton and Langstroth, Bee Pasturage, Selection of Bee Species for Apiculture, Bee Keeping Equipment, Methods of Extraction of Honey (Indigenous and Modern).

Unit 3: Bee Economy and Entrepreneurship in Apiculture (8 h)

Apiculture Industry and products of bees and their Uses (Honey, Bees Wax, Propolis, Pollen etc).

Practical (Credit: 1, Hours: 15)

1. Study of the various stages of Life cycle of Honey bee.
2. Identification of various equipment of bee keeping.
3. Methods of Extraction of Honey (Indigenous and Modern).
4. Structure of bee hives (Newton and Langstroth).
5. Preparation of slide- pollen basket, sting-apparatus.

6. Testing of purity of honey.
7. Preparation of a report on pathogens and pests of honey bees.

Suggested Readings

8. Post, P. J. (1962). Apiculture. Oxford and IBH, New Delhi.
9. Bisht D.S., Apiculture, ICAR Publication.
10. Singh S., Beekeeping in India, Indian Council of Agricultural Research, New Delhi.