

DISCIPLINE SPECIFIC ELECTIVE COURSE -19**Ichthyology****Zoo-DSE-19****CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Ichthyology Zoo-DSE-19	4	3	0	1	As per the Program Eligibility	Basic understanding of Zoology

Learning Objectives

The Learning Objectives of this course are as follows:

- To increase student familiarity with evolutionary history and taxonomic diversity of fishes.
- To improve understanding of the basic physiological and behavioural adaptations of fishes.
- To enhance students' skills in studying locally available fish species.
- To expose students to some of the issues surrounding the conservation of fish biodiversity in the environment.

The Learning Outcomes

The learning Outcomes of this course are as follows:

After studying this course, students can:

- Keep track of types of fishes and their morphology.
- Get detailed knowledge about the physiology of fishes.
- Attain knowledge of various feeding habits, adaptations, parental care, and reproduction of fishes.
- Attain advanced knowledge about the fishes which would be helpful for designing experiments for research.

Syllabus- DSE-19:

THEORY **45 hrs****Unit 1: Introduction to Fishes** **16 hrs**

Introduction and types of fishes, Classification, General Characters, Fish Origin: The diversification and relationships of jawless and jawed fishes, Fish morphology and anatomy: Scales, Teeth, Muscles, Swim-bladder, Gills, Fins, Skull, Weberian ossicles, Lateral-line system.

Unit 2: Fish Physiology **15 hrs**

Gas exchange, Internal transport and Homeostasis- Aquatic and Aerial respiration, Cardiovascular physiology, Hematology, Lymphoid organs, osmoionic regulation, Acid-base balance, nitrogen excretion and metabolism, Sensory systems—photoreception, chemoreception, mechanoreception, electroreception.

Unit 3: Reproduction and Development **8 hrs**

Oviparity and ovoviviparity, Prolific breeders, Fecundity, Induced breeding, Fish larval stages, Parental care in fishes.

Unit 4: Food and Feeding habits of Fishes and their Adaptations **6 hrs**

Fish foods and feeding habits, Adaptations in hill stream and deep-sea fishes, Types of migration in fishes, Abiotic factors and their influence on fish.

PRACTICALS: **30 hrs****(Laboratory periods: 15 classes of 2 hours each)**

1. Identification of local fishes by physical key methods.
2. Study of different types of fish scales.
3. Study of chromatophores of fishes under microscope.
4. Analysis of water quality parameters viz. temperature, pH, dissolved oxygen.
5. Fish Morphometric measurements: Standard length, Total length, Fork length, Dorsal fin height, Pectoral fin length, Ventral fin length, Anal fin height.
6. Study of anatomy of digestive systems among different types of fishes.
7. Gonado-somatic index.
8. Study of Weberian ossicles and otoliths.
9. Visit to local fish market/farm and report preparation.

Essential/Recommended Readings:

1. Biology of Fishes, Bone, Q. and Moore, R., Taylor and Francis Group, CRC Press, U.K.
2. The Physiology of Fishes, Evans, D. H. and Claiborne, J. D., Taylor and Francis Group, CRC Press, UK
3. The Senses of Fish Adaptations for the Reception of Natural Stimuli, von der Emde, R., Mogdans, J. and Kapoor, B. G., Narosa Publishing House, New Delhi, INDIA
4. Ichthyology, Lagler, K.F., Bardach, J.E. and Miller, R.R. John Wiley and Sons Inc., New York, USA
5. A textbook of fish biology and fisheries, Khanna S.S. and Singh H.R. Narendra publishing house, Delhi

Suggested readings:

1. Ichthyology, Karl F. Lagler, John E. Bardach, Robert R. Miller, Dora R. May Passino, Wiley, New York, USA
2. Ichthyology Handbook, Kapoor, B. G., Khanna, B. Springer Science & Business Media, 2004

NOTE: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.