Name of the Programme: M.Sc. Zoology

Course Code: ZOO-525 **Title of the Course:** Ichthyology (Theory)

Number of Credits: 03

Effective from AY: 2023-24

Pre-requisites for the Course:	Learners are expected to have a reasonable knowledge of fish biology concerning its anatomical and physiological systems.	
Course Objectives:	1. To enhance the comprehensive understanding of fish biology, emphasising anatomical and physiological adaptations to different aquatic habitats. 2. To provide an acquaintance with the life-history and taxonomic diversity of fishes. 3. To create a learning framework about fish species' ecology, behaviour and management.	
Content:	**Module1**	No of hours
	Fish diversity: natural history, evolution, and biogeographical distribution. Fish classification (selected orders) and diversity of freshwater and marine fishes of India concerning the Western coastline. Meristic and morphometric studies; truss morphometry.	7 hours
	Swimming modes and buoyancy in fishes. Functional anatomy of fish muscles: body waves, energetics. Physiological aspects of dynamic and static lift.	4 hours
	Mechanism of gas exchange in air-breathing organs and air bladder. Circulatory system: aquatic and aerial respiration, cardiovascular physiology and osmoregulation.	4 hours
	Module 2	
	Food and feeding biology: natural fish food, Components of food, food evaluation/consumption ratio, feeding mechanism. Types of feeding. Structural modifications to feeding habits. Digestive enzymes and glands. Gut content analysis.	5 hours
	Concept of growth: growth curve, biotic and abiotic factors affecting growth, the role of minerals, vitamins, and hormones in the regulation of growth, influence of nutrients in growth stimulation. Principles and method of age determination.	4 hours
	Reproductive system: sexual maturity, development of	6 hours

	gametes in male and female. Fecundity and embryonic development. Fish diseases, immune response to pathogens. Effect of abiotic, biotic, and xenobiotic stresses on the fish immune system. **Module 3** Behaviour: feeding, schooling, migration, courtship, and parental care. Adaptations and symbiotic associations. Sensory adaptations and coordination: lateral line system, acoustic system, photoreception, electro-receptors. Bioluminescence, chromatophores, and sensory organs in shellfish. Endocrine glands and neuroendocrine coordination. Pelagic and demersal fisheries of Indian coasts. The relevance of the fish and fishery sector in Goa concerning research, society, and economy.	10 hours 5 hours
Pedagogy:	Lectures/ tutorials/assignments/ small projects/self-study/presentations.	
References/ Readings:	1. B.R. Selvamani and R.K. Mahadevan, Freshwater fish farming, Campus Books International, 2008. 2. D. Pauly, P. Tyedmers, R. Froese, and L. Y. Liu, Fishing down and farming up the food web. Conservation Biology, 2001. 3. P. Cury, and D. Pauly, Patterns and propensities in reproduction and growth of fishes. Ecological Research, 2002. 4. K.I. Stergiou, Fish Base: The modern tool of ichthyology, fisheries biology and marine ecology. Proc. 12th Panhellenic Cong.,2005. 5. S. Jennings, M.J. Kaiser, and J.D. Reynolds, Marine fisheries ecology. Blackwell Science, London, 2001. 6. V. Jhingran, Fish and Fisheries of India 2nd Ed, Hind Publication, 1982. 7. S. Kumar and M. Thembre, Anatomy and Physiology of Fishes, Vikas Publishing House,1996 8. D. Bal, and K.P. Rao, Marine Fisheries of India, Tata McGraw Hill Publishers,1982. 9. M.J. Dutta, Fundamentals of Freshwater Biology, Narendra Publishing House, Delhi,2006. 10. C. Kurian, and V.O. Sebastia, Prawn and Prawn Fisheries of India, Hindustan Publishing Corp., Delhi,2002	
Course Outcomes:	At the end of the course, the learner will 1. Assess an in-depth knowledge of taxonomy, anatomy, and physiological function of the organ systems of fish.	

	2. Distinguish between the developing stages of reproductive organs that occur across the maturation period. 3. Interpret the knowledge about the growth, developmental perspective, behavioural strategies and ecological adaptations. 4. Predict the emerging issues surrounding fish research and fish exploitation.

(Back to top)