

**UNIVERSITY OF MADRAS**  
**M.Sc. DEGREE PROGRAMME IN ZOOLOGY**  
 SYLLABUS WITH EFFECT FROM 2023-2024

**531E4A**

**ELECTIVES ( INDUSTRY / ENTREPRENEURSHIP )**

**(SELECT ONE FOR SEMESTER IV)**

<b>Course Objectives:</b>		
The main objectives of this course is		
	Students should know basic concepts in Aquaculture.	
<b>Course</b>	<b>:</b>	<b><u>Elective (Industry / entrepreneurship) - 1</u></b>
<b>Course title</b>	<b>:</b>	<b>Aquaculture</b>
<b>Credits</b>	<b>:</b>	<b>2</b>
<b>Pre-requisite:</b>		
Students should know the fin fishes and shell fishes of commercially important candidate species.		
<b>Expected Course Outcome:</b>		
Upon completion of this course, Students would have		
I	To develop knowledge on the fish farm and their maintenance. Understand the methods of fish seed and feed production and develops knowledge on hatchery techniques	<b>K1 &amp; K2</b>
II	To apply the knowledge about different culture methods in aquaculture and gain knowledge on fish and shrimp breeding techniques and larval culture	<b>K3 &amp; K4</b>
III	Identifies the different fishes diseases, diagnosis and their management strategies. Understands Ornamental fishes and central aquaculture organizations	<b>K5 &amp; K6</b>

**K1-** Remember; **K2-** Understand; **K3-** Apply; **K4-**Analyze; **K5-**Evaluate; **K6-** Create

<b>Units</b>	
<b>I</b>	Importance of aquaculture- Present status, prospects and scope in India. Freshwater aquaculture- Brackishwater aquaculture- Mariculture -Types of fish culture - Construction and Types of fish ponds for culture practice. Water quality management. Fish farm implements - Secchi disc - aerator - pH meter - tools for hypophysation - feeding trays – Fishing gears used in aqua farming.
<b>II</b>	Procurement of seed from natural resources- collection methods and segregation. Hatchery technology for major carps and freshwater prawn. Artificial seed production –Breeding under control conditions, induced breeding technique, larval rearing, packing and transportation. Commercial substitute for pituitary extracts. Classification of fish feed- Artificial feeds And Live feeds.
<b>III</b>	Shrimp hatchery technology - Hatchery design, brood stock management, spawning, larval rearing, Shrimp developmental stages, algal culture, packing and transportation. Shrimp culture technology - extensive culture methods semi-

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	intensive - intensive culture methods - Biofloc technology - Culture operations (water quality, feed and health management) - harvesting, preservation and marketing.
<b>IV</b>	Fish and Shrimp diseases and health management – infectious diseases - Bacterial, Fungal, Viral, Protozoan; Non-infectious - environmental and nutritional diseases. Diseases diagnosis, prevention and control measures.
<b>V</b>	Types of ornamental fishes (freshwater and marine), their breeding behavior and biology. Oviparous, Ovo-viviparous and Viviparous fishes. Setting and maintenance of freshwater Aquarium tanks. Central aquaculture research organizations- CMFRI, CIBA, CIFT, CIFA, CIFE, MPEDA and its activities.
<b>Reading list</b>	
<ol style="list-style-type: none"> <li>1. Pillay, T. V. R. (1990). Aquaculture: Principles and Practices. Blackwell Scientific Publications Ltd.</li> <li>2. Santhanam, R. (1990). Fisheries Science. Daya Publishing House.</li> <li>3. Sinha, V.R. P. and Srinivastava, H. C. (1991). Aquaculture Productivity. Oxford and IBH Publications CO., Ltd., New Delhi.</li> <li>4. Yadav, B. N. (1997). Fish and fisheries. Daya Publishing house, New Delhi.</li> </ol>	
<b>Recommended texts</b>	
<ol style="list-style-type: none"> <li>1. Das M. C. and Patnaik, P. N. (1994) Brackish water culture. Palani paramount Publications, Palani, T. N.</li> <li>2. Day, F (1958). Fishes of India , VoL I and Vol. II. William Sawson and Sons Ltd., London.</li> <li>3. Jhingran, V. G. (1991). Fish and Fisheries of India. Hindustan Publishing Co., India</li> <li>4. Maheswari. K. (1983) Common fish disease and their control. Institute of Fisheries Education, Powarkads (M.P).</li> </ol>	

<b>Mapping with Programme Outcomes*</b>										
<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO1</b>	S	S	M	M	S	S	S	M	M	S
<b>CO2</b>	S	S	S	M	S	S	S	M	S	S
<b>CO3</b>	S	S	S	S	S	S	S	S	S	M
<b>CO4</b>	S	S	M	S	S	S	S	M	M	S
<b>CO5</b>	S	S0	M	S0	M	S	M	L	S	S

\*S-Strong; M-Medium; L-Low