Vidyasagar University

Curriculum for Industrial Fish &Fisheries (Major)

[Choice Based Credit System]

Semester-I

Course	Course Code	Name of the Subjects	Course Type/ Nature	Teaching Scheme in hour per week			Credit	Marks
				L	T	P		
CC1		**C1T:**Taxonomy, Classification and evolution of fishes	Core Course-1	4	0	0	6	75
		C1P: Taxonomy, Classification and evolution of fishes		0	0	4		
CC2		**C2T:** Capture Fisheries	Core Course-2	4	0	0	6	75
		C2P: Capture Fisheries		0	0	4		
GE1		**TBD**	Generic Elective-1				4/5	75
							2/1	
AECC		English	AECC (Elective)	1	1	0	2	50
Semester Total							**20**	**275**

L=Lecture, **T=**Tutorial, **P=**Practical, **CC-** Core Course, **TBD -** To be decided, **AECC-** Ability Enhancement Compulsory Course

Generic Elective (GE) (Interdisciplinary) from other Department [Paper will be of 6 credits]. Papers are to be taken from following discipline: **Physics/Botany/Zoology/Geography/ Economics.**

Modalities of selection of Generic Electives (GE): A student shall have to choose **04** Generic Elective (**GE1 to GE4**) strictly from **02** subjects / disciplines of choice taking exactly **02** courses from each subjects of disciplines. Such a student shall have to study the curriculum of Generic Elective (GE) of a subject or discipline specified for the relevant semester.

SEMESTER –I
CORE COURSE (CC)

CC-1: FISH TAXONOMY, CLASSIFICATION AND EVOLUTION Credits 06

C1T: Taxonomy, Classification and Evolution of fishes Credits 04

Principles of taxonomy, Nomenclature, types. Classification and interrelationships. Criteria for generic and specific identification. Morphological, morphometric and meristic characteristics of taxonomic significance. Method employed in phylogenic studies. Phylogenic tree. Fish identification and fish bar-coding. Major taxa of inland and marine fishes (up to sub-order level). Commercially important fishes of the World. Study of external morphology and classification (up to Sub-class) of Crustacea, Bivalvia, Gastropoda and Cephalopoda.Scopeanddefinition.Methodemployedinphylogenicstudies. Phylogenic tree. Fish identification and fish bar-coding, cataloguing.Originandevolutionofmajorgroupsoffishes,Evolutionary strategies and morphological innovation. Evolutionary genetics. Dipnoan and Living fossils of fishes.

C1P:Taxonomy, Classification and evolution of fishes Credits 02

1. Study of morphometric and meristic characteristics of collected fishes (finfishes & shellfishes), Study of types of fish scales.
2. Identificationofcommonfinfishesavailable from different aquatic resources of India.
3. Identification of common shellfishes available from different aquatic resources of India.
4. Identification of Agnathan fishes, Chimera, Dipnoan and Coelacanth fishes.
5. Study the morphometry of different fishes.
6. Preparationoftaxonomickey.
7. Construction of chart regarding study of the phylogenetic tree/evolutionary tree.
8. Preparation of fish bar-coding.

CC-2: CAPTURE FISHERIES **Credits 06**

C2T: Capture Fisheries **Credits 04**

Freshwater fishery regions of the world and their major fisheries, species composition, Global inland fish production statistics. Inland fishery resources of India, Present scenario of inland capture fisheries of India, their potential, problems. Trend of inland capture fish production, Major riverine and estuarine fisheries of India. Fisheries of major rivers/reservoirs/lakes of India. Coldwater fisheries of India.Overview of marine fishery resources of the world and India. Classification and definition of fishery zones, offshore and deep sea fisheries of India. The major important fin fish and shell fish resources and their economic management. Major pelagic and demersal fisheries of India. Crafts and gears operated in Indian marine water. Marine fisheries development in India. The concept of total catch and catch per unit effort. Remote sensing potential marine fishing zones (PFZ), EEZ. Conservation of marine fishery resources.

C2P: Capture Fisheries lab **Credits 02**

1. Analysis of species composition of commercial catches at landing and assembly centers, sampling and familiarization of commercially important groups.
2. Study of external morphology, collection, preservation and identifications of prawns, crabs, lobsters, bivalves, gastropods, cephalopods, echinoderms from natural habitats.
3. Observations and experimental operations of selected fishing gears in marine water of India, Maintenance of records on catch statistics and observations.
4. Visit to a fish landing centers, observation and analysis of catches by major craft and gears.
5. Field collection of samples of fishes, crustaceans and molluscs, and their analysis for biological characteristics. Participations in fishing trips and research

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Semester-II

Course	Course Code	Name of the Subjects	Course Type/ Nature	Teaching Scheme in hour per week			Credit	Marks
				L	T	P		
CC3		**C3T**: Fish Anatomy and Biology	Core Course-3	4	0	0	6	75
		C3P: Fish Anatomy and Biology **(Practical)**		0	0	4		
CC4		**C4T**: Aquaculture practices	Core Course-4	4	0	0	6	75
		C4P: Aquaculture practices **(Practical)**		0	0	4		
GE2		**TBD**	Generic Elective-2				4/5	75
							2/1	
AECC		ENVS	AECC (Elective)				4	100
Semester Total							**22**	**325**

L=Lecture, **T=**Tutorial, **P=**Practical, **CC-** Core Course, **TBD -** To be decided, **AECC-** Ability Enhancement Compulsory Course

Generic Elective (GE) (Interdisciplinary) from other Department [Paper will be of 6 credits]. Papers are to be taken from following discipline: **Physics/Botany/Zoology/Geography/ Economics.**

Modalities of selection of Generic Electives (GE): A student shall have to choose **04** Generic Elective (**GE1 to GE4**) strictly from **02** subjects / disciplines of choice taking exactly **02** courses from each subjects of disciplines. Such a student shall have to study the curriculum of Generic Elective (GE) of a subject or discipline specified for the relevant semester.

SEMESTER –II

CORE COURSE (CC)

CC-3: FISH ANATOMY AND BIOLOGY **Credits 06**

C3T: Fish Anatomy and Biology (Theory) **Credits 04**

Study of internal anatomy of shell fishes and fin fishes having commercial importance. Study of the oral region and associated structures, (teeth, gill rakers, buccopharyngial region, Digestive system; Oesophagus, stomach, intestine and rectum).Associated digestive glands (liver, pancreas, gall bladder). Circulatory system, respiratory system, nervous system and urinogenital system / reproductive system of fishes and shellfishes. Osteology of fishes. Study of food and feeding habits of commercially important fin fishes and shell fishes. Age and growth of commercially important fin fishes and shell fishes. Marking and tagging; Length-weight relationship. Water as a biological medium; respiration, digestion, excretion, osmoregulation and reproductive physiology Reproductive biology – maturity stages, gonado somatic index, sex ratio, spawning and fecundity. Eggs and larval stages and developmental biology of fin fishes and shellfishes.

C3P: Fish anatomy and biology (Practical) **Credits 02**

1. Study of the digestive and circulatory systems of common species of finfishes.
2. Study of the urinogenital and nervous system of different species of locally available finfishes.
3. Study of the digestive and nervous system of shellfishes.
4. Accessory respiratory organs of fishes.
5. Study of the Length-Weight relationship, Relative gut length, Gastro-Somatic index of fish.
6. Study of the feeding behavior, mouth-parts modification and gut content analysis from different fish groups.
7. Preparation of endoskeleton.
8. Marking and Tagging.

CC-4: AQUACULTURE PRACTICES — Credits 06

C4T: Aquaculture Practices (Theory) — Credits 04

Different freshwater aquaculture systems. Preparation and management of nursery and rearing ponds. Control of aquatic weeds and algal blooms. Monoculture and polyculture of carps, stocking density and ratio, supplementary feeding. Criteria for selection of candidate species for aquaculture. Technology of semi-intensive, intensive and super intensive systems of aquaculture. Aquaculture in running water system, re-circulatory system, cages and pens. Air-breathing fish culture. Culture of cold water fishes. Culture of freshwater prawns. Definition, history and scope of integrated aquaculture. Principles of organic recycling and detritus food chain. Integration of crop, livestock and fish farming as complimentary activities. Wastewater aquaculture and Paddy-cum fish culture. Ornamental fish culture as hobby. Setting up of freshwater and marine aquaria. Selection of suitable species, species combination. Use of natural and artificial aquatic plants and decorative toys. Use of biological filters, aerators, heaters etc. Commercial breeding and culture of ornamental fishes. Methods of production of live and artificial feeds. Common diseases of ornamental fishes and their control. Transport of live ornamental fishes and Aquascaping. Resource of marine species for shore-based aquaculture and sea farming in India. Cultivable traits of important candidate species of fish and shelfish with notes on their biology (Sea bass, Mullets, Milkfish, Groupers, Tiger shrimp, Mud crab, Mussels, Clams, Oysters etc.). Shore-based aquaculture systems: traditional (Pokkali, Bheries), semi-intensive aquaculture practices of commercially important species. Management of marine fisheries.

C4P: Aquaculture Practices (Practical) — Credits 02

1. Study of cultivable species of fin fishes and shellfishes.
2. Collection and study of predatory fishes, weed fishes.
3. Collection and study of aquatic weed and aquatic insects from fish ponds.
4. Practical experience in the preparation and management of nursery, rearing and stocking tanks.
5. Study of effect of liming, manuring and fertilization of fish ponds and on growth of fishes.
6. Methods of isolation and identification of different live feed organisms.
7. Laboratory scale culture (batch and continuous) of selected live feed organism.
8. Mass culture of live fish food organisms. Study of algal blooms and their control.
9. Identification of common ornamental fishes and plants.
10. Setting and maintenance of aquaria. Designs and construction of indoor aquaria.
11. Identification of fish diseases and prophylactic measures.
12. Culture of ornamental fishes.
13. Transport of live ornamental fishes.
14. Visit to an Ornamental fish farm/ integrated fish farm/ IMC farm.

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