VIDYASAGARUNIVERSITY

Midnapore, West Bengal

PROPOSED CURRICULUM&SYLLABUS (DRAFT) OF

BACHELOR OF SCIENCE (HONOURS)

MAJOR IN AQUACULTURE MANAGEMENT

4-YEAR UNDERGRADUATE PROGRAMME

(w.e.f. Academic Year 2023-2024)

Based on

Curriculum & Credit Framework for Undergraduate Programmes

(CCFUP), 2023& NEP, 2020

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VIDYASAGAR UNIVERSITY
BACHELOR OF SCIENCE (HONOURS) MAJOR IN AQUACULTURE MANAGEMENT
(under CCFUP, 2023)

Level	YR.	SEM	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
								CA	ESE	TOTAL
B.Sc. (Hons.)	1st	I	**SEMESTER-I**							
			Major-1	ACMHMJ101	**T: Taxonomy and Evolution of Fin Fishes and Shell Fishes** **P: Practical**	4	3-0-1	15	60	75
			SEC	ACMSEC01	**P: Ornamental Fish Production and Aquarium Management**	3	0-0-3	10	40	50
			AEC	AEC01	Communicative English -1 (***common for all programmes***)	2	2-0-0	10	40	50
			MDC	MDC01	Multidisciplinary Course -1 (***to be chosen from the list***)	3	3-0-0	10	40	50
			VAC	VAC01	ENVS (***common for all programmes***)	4	2-0-2	50	50	100
			Minor-1 (Disc.-I)	ACMMI01	**T: Fundamentals of Fisheries and Aquaculture; P: Practical** ***(To be taken by students of other Disciplines)***	4	3-0-1	15	60	75
			Semester-I Total			20				400
		II	**SEMESTER-II**							
			Major-2	ACMHMJ102	**T: Aquaculture Practices** **P: Practical**	4	3-0-1	15	60	75
			SEC	ACMSEC02	**P: Seed production of Carp, Catfishes and Prawn/Shrimp**	3	0-0-3	10	40	50
			AEC	AEC02	MIL-1 (***common for all programmes***)	2	2-0-0	10	40	50
			MDC	MDC02	Multi Disciplinary Course-02 (***to be chosen from the list***)	3	3-0-0	10	40	50
			VAC	VAC02	Value Added Course-02 (***to be chosen from the list***)	4	4-0-0	10	40	50
			Minor-2 (Disc.-II)	ACMMI02	**T: In land fisheries resources, fish breeding and seed production** **P: Practical** ***(To be taken by students of other Disciplines)***	4	3-0-1	15	60	75
			Summer Intern.	CS	Community Service	4	0-0-4	-	-	50
			Semester-II Total			24				400
			TOTAL of YEAR-1			44				800

MJ = Major, MI = Minor Course, SEC = Skill Enhancement Course, AEC = Ability Enhancement Course, MDC = Multidisciplinary Course, VAC = Value Added Course; CA= Continuous Assessment, ESE= End Semester Examination, T = Theory, P= Practical, L-T-P = Lecture-Tutorial-Practical, MIL = Modern Indian Language, ENVS = Environmental Studies

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MAJOR (MJ)

MJ-1: Taxonomy and Evolution of Fin fishes and Shell fishes Credits 04(Full Marks: 75)

MJ-1T: Taxonomy and Evolution of Fin fishes and Shell fishes Credits 03

Course contents:

Definition and importance of Systematics and Taxonomy. Micro & macro taxonomy, stages of taxonomy. Rules of Nomenclature. Classification and interrelationships. Newer trends in taxonomy-Biochemical, Cytological & Molecular approaches. Origin & Evolution of fishes. Phylogenic tree. Method employed in phylogenic studies. Species concept: Biological, typological & Evolutionary. Mechanism of Speciation. Morphometric and meristic characteristics of taxonomic significance. Subspeciesand other intraspecific categories. Type concept. Classification: Major taxa of inland, brackish and marine fin fishes (up to order level). Commercially important fishes of the World. Study of external morphology and classification (up to Sub-class) of economically important Crustacea, Bivalvia, Gastropoda and Cephalopoda.

MJ-1P: Taxonomy and Evolution of Fin fishes and Shell fishes (Practical) Credits 01

List of Practical

1. Collection, preservation and taxonomic study of commercially important Inland, Estuarine and marine fin fishes and shell fishes (prawns, crab, lobsters, bivalves, gastropods, cephalopods).
2. Study themorphometric and meristic characteristics of collected fishes (fin fishes & shell fishes).
3. Study the different types of fish scales.
4. Preparation of Taxonomic key
5. Study of Phylogenetic Tree

MJ-2: Aquaculture Practices Credits 04(Full Marks: 75)

MJ-2T: Aquaculture Practices Credits 03

Course contents:

1. **Freshwater Aquaculture**: 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

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and Paddy-cum fish culture.

2. **Coastal Aquaculture and Mariculture**: Resource of marine species for shore-based aquaculture and sea farming in India. Cultivable traits of important candidate species of fish and shell fish (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. Sea weed culture. Problems of and prospects of Mariculture in India.

MJ-2 P: Aquaculture Practices (Practical) **Credits: 01**

1. Study of cultivable species of fin fishes and shellfishes. Collection and study of predatory fishes. Collection and study of aquatic weed and aquatic insects from fish ponds.

2. Practical experience in the preparation and management of nursery, rearing and stocking tanks.

3. Calculation of lime requirement. Calculation fertilizer requirement of fish ponds and on growth of fishes.

4. Methods of isolation and identification of different live feed organisms. Laboratory scale culture of selected live feed organism. Mass culture of live fish food organisms. Study of algal blooms and their control.

5. Calculation of supplementary feed requirement and study the growth of fishes.

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MINOR (MI)

MI-1: Fundamentals of Fisheries & Aquaculture **Credits 04 (Full Marks: 75)**

MI-1 T: Fundamentals of Fisheries & Aquaculture (Theory) Credits: 3

Course contents:

1. General knowledge about fish. Importance of fish in human nutrition. Present status of Indian and world capture fisheries.
2. Commercially important freshwater and marine water Fin fishes & Shellfishes, their economic value.
3. Different system of Aquaculture: Extensive, semi-intensive, intensive culture of fish. Management of Aquaculture system
4. Non-conventional Aquaculture: Pen-culture, cage-culture, race-way culture, Jhora fed fisheries.
5. Importance of Aquaculture.

MI-1 P: Fundamentals of Fisheries & Aquaculture (Practical) **Credits: 1**

List of Practical

1. Identification of commercially important freshwater brackish water and marine water Finfish & Shellfishes.
2. Study of cultivable species of shellfishes of India
3. Collection of predatory and weed fishes.
4. Identification of aquatic weeds.
5. Preparation of Model /Chart for different system of aquaculture

MI-2: Inland fisheries resources, fish breeding & seed production **Credits 04 (Marks: 75)**

MI-2T: Inland fisheries resources, fish breeding & seed production **Credits 03**

Course contents:

1. Inland fisheries resources (Freshwater and brackish water)
2. Present status, prospect and problems of Inland fisheries in India.
3. Freshwater fishery resources of the world and their major fisheries.

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4. Natural fish and shellfish seed sources.
5. Different types of fish ponds, criteria for ideal fish culture pond, pre-stocking management of nursery.
6. Brood fish/shellfish management.
7. Induced breeding of fishes and shell fishes and seed production. Use of synthetic hormones, different types of hatchery for IMC breeding.
8. Culture practice of spawn, fry and fingerling in different rearing ponds.
9. Fish seed transportation

MI-2 P: Inland fisheries resources, fish breeding and seed production
(Practical) Credits 01

1. Pituitary gland collection, preservation, preparation of pituitary gland extract forinjection.
2. Identification of brood fin fish and shellfish.
3. Identification of different life stages of cultivable fish species: spawn, fry, and fingerling.
4. Study of model hatchery.
5. Study the different stages of eggs, spawn and fry.

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SKILL ENHANCEMENT COURSE (SEC)

SEC-1: **Ornamental Fish Production and Aquarium Management**
(Practical) **Credits: 03**

1. Identification of freshwater water ornamental fishes and plants.
2. Fabrication of glass aquarium. Setting up and maintenance of Aquarium accessoriesand equipment.
3. Conditioning and packing of ornamental fishes.
4. Preparation of feed for ornamental fishes.
5. Setting up of breeding tank for live bearers, barbs, goldfish, tetras,chiclids, gouramis, fighters and catfishes.
6. Identification of common ornamental fish diseases with possible prophylactic measures and treatment.
7. Conditioning, packing, transport and quarantine methods. Trade regulations and wild life act in relation to ornamental fishes.
8. Study the water quality parameter of home aquarium and management.

SEC-2: **Seed production of Carp, Catfishes and Prawn/Shrimp**

(Practical) **Credits: 03**

1. Study of maturity stages in fishes. Mitotic and meiotic chromosome preparation.
2. Demonstration of protocol of androgenesis, gynogenesis and polyploidy. Study on gene and genotypic frequency. Gamete cryopreservation protocols and quality evaluation of fish milt.
3. Collection and preservation of fish pituitary gland, preparation of PG extract, Hypophysation. Calculation of Gonado Somatic Index and fecundity.
4. Brood-stock maintenance and selection of breeders for injection. Histological studies of ovary and testes. Different fish hatchery systems, study of fish eggs and embryonic developmental stages. Identification of eggs, spawn, fry and fingerlings of different species.
5. Preparation and management of fish nursery. Fish seed and brood-stock transportation, use of anesthetics, disinfectants and antibiotics in fish breeding.
6. Water quality monitoring in fish hatcheries and nurseries. Breeding and larval rearing of common finfishes/shellfishes.
7. Visit to any fin fish and shell fish hatchery.

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