

# **VIDYASAGARUNIVERSITY**

Midnapore, West Bengal



*PROPOSED CURRICULUM&SYLLABUS (DRAFT) OF*

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**BACHELOR OF SCIENCE (HONOURS)  
MAJOR IN AQUACULTURE MANAGEMENT**

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**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, PASCHIM MIDNAPORE, WEST BENGAL

**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.)	2 <sup>nd</sup>	III	<b>SEMESTER-III</b>								
			Major-3	ACMHMJ03	T: Fisheries Resources, Management, and Conservation P: Practical	4	3-0-1	15	60	75	
			Major-4	ACMHMJ04	T: Fish Nutrition and Feed Technology P: Practical	4	3-0-1	15	60	75	
			SEC	ACMSEC03	P: Field study	3	0-0-3	10	40	50	
			AEC	AEC03	Communicative English -2 ( <i>common for all programmes</i> )	2	2-0-0	10	40	50	
			MDC	MDC03	Multidisciplinary Course -3 ( <i>to be chosen from the list</i> )	3	3-0-0	10	40	50	
			Minor-3 (Disc.-I)	ACMMIN03	T: Aquatic Biodiversity and Conservation; P: Practical ( <i>To be taken by students of other Disciplines</i> )	4	3-0-1	15	60	75	
			<b>Semester-III Total</b>						<b>20</b>		

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

## MAJOR (MJ)

**MJ-3: Fisheries Resources, Management, and Conservation      Credits 04(Full Marks: 75)**

**MJ-3T: Fisheries Resources, Management, and Conservation      Credits 03**

### **Course Objectives:**

1. To have comprehensive knowledge on fisheries resources.
2. To learn about sustainable management practices for fisheries resources.
3. To explore conservation strategies for fisheries and aquatic biodiversity.

### **Course contents:**

Classification of fisheries resources. Types of fisheries. Importance of fisheries in global and local economies. Fisheries as a source of food, livelihoods, and recreational activities. Trends, challenges, and future prospects of global and Indian fisheries. Fish diversity in different fisheries resources. Principles and objectives of sustainable fisheries. Ecosystem-based management approaches. Global challenges and opportunities in sustainable fisheries. Methods of estimation of fish population and maximum sustainable yield. Impacts of climate change on fish populations. Types of gears used in marine and freshwater fisheries. Community based fisheries resource management. Importance of conserving endangered and threatened fish species. Importance of seasonal restrictions. Strategies for fish habitat protection and restoration. Role of marine protected areas and freshwater sanctuaries. *In-situ* and *ex-situ* conservation strategies for fish species. Conservation of fish migration routes and migratory species.

**MJ-3P: Practical**

**Credits 01**

### **Practical:**

Practical identification of fish/aquatic species and their ecological roles. Practical work on water quality testing, and stock assessment technique. Field visits to fish farms, marine, coastal and riverine ecosystems.

### **Suggested readings**

1. Fish and Fisheries of India by V.G. Jhingran 3rd Edn. Hindustan Publishing Corporation. 1991.
2. Handbook of Fisheries and Aquaculture. ICAR Publication New Delhi.
3. Coldwater Fisheries of India. Edited by V. G. Jhingran and K. L. Sehgal, IFSI, Kolkata.
4. Management Systems for Riverine Fisheries. FAO Fisheries Technical Paper. FAO, 1986.
5. Reservoir Fisheries of India. by V.V. Sugunna. FAO, 1995.
6. Principles of Fisheries Management by R. H. R. Francis.
7. Fisheries Management: A Manual for the Management of Fisheries by J. M. Kapetsky.
8. Fisheries Conservation and Management by K. J. H. Chao.

**MJ-4: Fish Nutrition and Feed Technology****Credits 04(Full Marks: 75)****MJ-4T: Fish Nutrition and Feed Technology****Credits 03****Objectives**

1. To have a basic understanding of fish nutrition and the functions of various nutrients.
2. To gain knowledge on the formulation and preparation of finfish & shell fish feed.

**Course contents:**

Fundamentals of fish nutrition and growth in fish. Principal nutrients and nutritional requirements of cultivable fish and shellfish. Nutritional energetics: definition and forms of energy partitioning. Methods of feed formulation and manufacturing. Forms of feeds: wet feeds, moist feeds, dry feeds, mashes, pelleted feeds, floating and sinking pellets. Feed additives: binders, antioxidants, enzymes, pigments, growth promoters, feed stimulants. Feed storage: use of preservatives and antioxidants. Feed evaluation: feed conversion ratio, feed efficiency ratio, protein efficiency ratio, net protein utilization and biological value. Feeding devices and methods. Non-conventional feed ingredients and antinutritional factors. Digestive enzymes, feed digestibility. Factors affecting digestibility. Nutritional deficiency diseases.

**MJ-4 P: Practical****Credits: 01**

Proximate composition analysis of feed ingredients and feeds. Formulation and preparation of artificial feeds. Determination of sinking rate and stability of feeds. Equipments and machineries used in feed production. Visit to commercial feed plant.

**Suggested readings**

1. ADCP (Aquaculture Development and Co-ordination Program). 1980. Fish Feed Technology, ADCP/REP/80/11. FAO., Rome.
2. De Silva, S. S. and Anderson, T. A. 1995. Fish Nutrition in Aquaculture, Chapman and Hall Aquaculture Series, London.
3. FAO training manual related to feed analysis.
4. Guillame, J., Kaushik, S., Berqot, P. and Metallier, R. 2001. Nutrition and Feeding of Fish and Crustaceans, Springer Praxis Publishing, Chichester, U.K.
5. Halver J. E. 1989. Fish Nutrition, Academic Press, San Diego, California.
6. Halver, J. E. and Hardy, R. W. 2002. Fish Nutrition. Academic Press, London.
7. Halver, J. E. and Tiews, K. T. 1979. Finfish Nutrition and Fish feed Technology Vol. I and II Heenemann, Berlin.
8. Hopher, B. 1988. Nutrition of Pond Fishes. Cambridge University Press, Cambridge.
9. Lovell, R. T. 1998. Nutrition and Feeding of Fishes. Kluwer Academic Publishers.
10. New, M.B. 1987. Feed and Feeding of Fish and Shrimp. A Manual on the Preparation and Preservation of Compound Feeds for Shrimp and Fish in Aquaculture. ADCP/REP/87/26 F.A.O. Rome.
11. Paulraj, R., 1993. Aquaculture Feed. CMFRI publication, 84 pp.

**MINOR (MI)**

**MI-3: Aquatic Biodiversity and Conservation**

**Credits 04 (Full Marks: 75)**

**MI-3 T: Aquatic Biodiversity and Conservation (Theory)**

**Credits: 03**

**Objectives**

1. To provide understanding of aquatic biodiversity, including species, ecosystems, and their functions.
2. To learn the threats to aquatic biodiversity, and explore strategies for conservation and management.

**Course contents:**

Types of aquatic ecosystems, Aquatic ecosystems their function and services. Aquatic species: Fish, amphibians, invertebrates, algae, and aquatic plants. Threat to aquatic system and biodiversity. Invasive aquatic species and impact and management. Conservation strategies of biodiversity and habitat. International Conventions and Agreements. National and Regional Policies and Laws

**MI-3 P: Practical**

**Credits: 01**

**Practical Outline:**

Identification of aquatic organism (vertebrates/invertebrate/microbes) and plants. Study on exotic/invasive aquatic species and their impacts. Calculation of biodiversity index.

**Suggested readings:**

1. Aquatic ecosystems: trends and global prospects. Cambridge University Press. Aquatic Biodiversity: Science and Technology by Polunin, N.V. ed., 2008.
2. Aquatic biodiversity conservation and ecosystem services. Springer Singapore Nakano, S.I., Yahara, T. and Nakashizuka, T. eds., 2016. .
3. Freshwater fisheries ecology John Wiley & Sons. Craig, J.F. ed., 2015.
4. Marine Conservation Biology: The Science of Maintaining the Sea's Biodiversity. Gerrodette, T., 2007.
5. FAO Technical Papers on Aquatic Biodiversity and Conservation.

**SKILL ENHANCEMENT COURSE (SEC)**

**SEC-3: Field study on Aquaculture/ Post-harvest technology and quality control / Feed formulation & management (Practical)**

**Credits: 03**

*To be carried out in Aquaculture farms/Processing plants/ Commercial Feed production unit or related organization/Institution*

**Duration:** 3 weeks.

**Assessment:** Report-30 marks, Viva-voce- 10 marks,