Module for

Certificate Course on Fisheries

(Course Duration-1Year)

College of Fisheries
Central Agricultural University, Imphal
Lembucherra Tripura-799210

Certificate Course on Fisheries

Minimum Educational Criteria for One Year Certificate Course on Fisheries:

The minimum educational qualification for enrollment in the one-year Certificate course in Fisheries is a successful completion of Class 12 in any division within the science stream. Applicants should have studied the subjects: English, Biology, Physics, and Chemistry at class 12 level. This criterion has been established to ensure that applicant possess the basic knowledge of science that is necessary to understand the topics covered in the courses offered for certificate course. The inclusion of these subjects is crucial for students to effectively catch up with and grasp the essential concepts and skills emphasized in the curriculum.

Age: Minimum 18 year

Language of Teaching: English

Total seat: 20 (Minimum 10 seats to be filled up for starting the course)

Course Duration: 1 Year (Two Semesters)

Tuition Fee: Rs. 35000/ semester

Accommodation Fee: Rs. 2000/month

Food: Food bill is to be paid by the candidate to the college canteen as per the approved rate.

Contact Person: Interested eligible candidate may contact to the course coordinators through email/phone for application form and other information related to registration for the course.

<table>
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DISTRIBUTION OF COURSES

1st Semester

Sl. No.	Course code	Course title	Credit hours
1	CCF - 111	Freshwater Aquaculture	2+2
2	CCF - 112	Fish Culture System	1+1
3	CCF - 113	Fish Health Management	1+1
4	CCF - 114	Breeding and Seed Production of Fresh water Fish	1+2
5	CCF - 115	Ornamental Fish Production	1+2
6	CCF - 116	Value addition of Fish	1+2
7	CCF - 117	Fisheries Business Management	1+2
		Total Credit	**20(8+12)**

2nd Semester

Farm practice / Induction training

Sl. No.	Areas for Farm practice/Induction training	Duration	Equivalent credit
1	Farming Systems of N.E Region (on farm and off farm visit)	2 weeks	0+2
2	Freshwater Fish Farm and Ornamental Fish Production	5 weeks	0+4
3	Freshwater Hatcheries	4 weeks	0+3
4	Feed Production and Marketing	3 weeks	0+2
5	Fish Preservation and Product Development	4 weeks	0+3
6	Fish Farm Design and Construction	2 weeks	0+2
8	Formulation of Fisheries Business Plan	2 weeks	0+2
9	Report Writing & Evaluation	2 weeks	0+2
	Total Credit		**0+20**

SYLLABUS

1. CCF-111 Freshwater Aquaculture (2+2)

Theory:

Introduction to freshwater aquaculture, Identification of major species available in India, Food and feeding habits of commercially important fin fish and shellfish species, Layout, design, and construction of ponds, Hatchery Design and Construction, Water supply and drainage systems in farm and hatchery. Productivity and carrying capacity of ponds, Factors affecting productivity, Liming, Nutrient management through fertilizer and manure application, Nursery pond preparation and management, Grow-out pond preparation and management, Culture method of important fresh water fishes and shellfishes, viz. Indian Major Carps, Tilapia, Exotic carps, Pangasius, Mahseer, Trout, Catfishes, Murrels, Freshwater prawns, fresh water pearl culture, Fish nutrition and metabolism, Nutritional requirements of fish, Fish feed formulation, preparation, and feeding management, Monitoring and maintaining optimal water quality parameters, Fish and fish seed Transport. Biosecurity measures in aquafarms, Health management in aquaculture

Practical

Study of cultivable varieties of freshwater fish species, Collection and identification of aquatic weeds, insects, predatory and weed fishes, Estimation of plankton, Study of different fertilizers and methods of their application in pond, Water and soil conditioning through liming, Preparation and management of nursery, rearing, and grow-out ponds, Techniques for regular sampling and growth assessment, Fish and Fish Seed Transport Techniques, Fish disease diagnosis and treatment techniques, Cost-benefit analysis of grow-out operations, Visit to Various Freshwater Farms

2. CCF-112 Fish culture systems (1+1)

Theory

Historical development and overview of fish culture systems, Component verses system approach. Integrated fish farming: definition and characteristics, material cycling and ecological efficiency, necessities and feasibility of integrated fish farming, Management of integrated fish farming systems: Rice-Cum-Fish Culture, Poultry-Cum-Fish Culture, Pig-Cum-Fish Culture, Cattle-Cum-Fish Culture, Duck-Cum-Fish Culture, Horticulture-Cum-Fish Culture; Biofloc Technology: Basic principles of Biofloc technology, Management practices for successful Biofloc systems; Recirculating Aquaculture Systems (RAS): Components and layout of RAS, Design considerations for different species, Water quality monitoring and control, Adapting RAS for various fish species; Aquaponics: Basics of aquaponics, System design principles and management strategies; Integrated Multi-Trophic Aquaculture (IMTA): Principles and benefits of IMTA, Species selection and system design,Management Practices for IMTA; Future Trends and Technological Innovations in Fish Culture

Practical

Demonstration of using animal manure for fertilizing fish ponds. Preparation of Compost and vermicompost. Visit to poultry farm, dairy farms, fish farms, mushroom farms with a view to learn the scope of integration with fish culture systems. Practical management of a Biofloc system. Monitoring of a RAS system. Set up a small-scale aquaponics system and management. Economic analysis of integrated fish farming.

3. CCF-113 Course Name: Fish Health Management, (1+1)

Theory

1. Introduction to Fish Health Management
2. Anatomy and Physiology of Fish
3. Water Quality and its Impact on Fish Health
4. Common Fish Diseases: Bacterial, Viral, Fungal, and Parasitic
5. Disease Diagnosis and Treatment Methods
6. Preventive Measures: Quarantine, Vaccination, and Biosecurity
7. Nutritional Requirements and Feeding Practices
8. Stress Management in Fish
9. Environmental and Management Practices for Optimal Health
10. Case Studies and Current Trends in Fish Health Management

Practical:

1. Water Quality Testing: Sampling and analysis of water parameters (pH, DO, ammonia, nitrites, nitrates etc.).
2. Fish Anatomy and Physiology: Dissection and identification of internal organs; understanding fish physiology.
3. Disease Diagnosis: Identifying symptoms, collecting samples (gill, skin, internal organs), and microscopic examination for parasites, bacteria, and fungi.
4. Pathogen Isolation and Identification: Culture techniques for bacteria and fungi; PCR for viral pathogens.
5. Treatment Protocols: Administration of medications, vaccines, and preventive measures.
6. Biosecurity Practices: Implementing quarantine, hygiene, and disinfection procedures.
7. Health Management Plans: Developing and implementing health management plans for aquaculture systems.
8. Field visit to a local aquaculture facility or fish farm, Conducting on-site health assessments and observations

4. Course CCF114: Breeding and seed production of freshwater fishes (1+2)

Theory

1. Natural breeding of fin fishes, collection, acclimatization and transportation of riverine spawn

2. Methods of breeding, bundh breeding, hypophysation of fish, fish pituitary gland, collection, preservation and preparation of extract for injection, dosage and methods of injection
3. Brood stock management and transportation of brood fish. Synthetic hormones used for induced breeding of carps
4. Techniques of fish breeding, types of hatcheries, treatment of eggs, spawn rearing techniques. Natural resource of shell fishes, life cycle of important shell fishes
5. Seasonal maturity and breeding seasons of different shell fishes

Practical

1. Collection and preservation of fish pituitary gland
2. Preparation of pituitary gland extract, protocol for hypophysation
3. Broodstock maintenance and collection of brooders for injection
4. Exposure to different fish hatchery systems
5. Identification of egg, spawn, fry and fingerlings of different species
6. Preparation and management of nursery ponds. Breeding and larval rearing of *M. rosenbergii*
7. Field visit to carp and freshwater prawn hatchery

5. CCF-115 Ornamental fish production (1+2)

Theory

World trade of ornamental fish and export potential, Different varieties of exotic and indigenous fishes, Water quality management, Water filtration systems - Biological, Mechanical, and Chemical, Aquarium plants and their propagation methods, Lighting and Aeration, Aquarium accessories and decoratives, Aquarium fish feeds - Dry, Wet, and Live Feeds, Breeding and rearing of ornamental fishes, Broodstock management, Application of genetics and biotechnology for producing quality strains, Management practices of ornamental fish farms, Common diseases and their control, Conditioning, Packing, Transport, and Quarantine methods, Trade regulations and wildlife act in relation to ornamental fishes

Practical

Identification of common ornamental fishes; Identification of common ornamental plants; Fabrication of all-glass aquarium; Setting up aquarium accessories; Maintenance of aquarium equipment; Conditioning of ornamental fishes; Packing of ornamental fishes; Preparation of feed; Setting up breeding tank for Live Bearers; Setting up breeding tank for Barbs; Setting up breeding tank for Goldfish; Setting up breeding tank for Tetras; Setting up breeding tank for Cichlids; Setting up breeding tank for Gouramis; Setting up breeding tank for Fighters (Betta); Setting up a tubifex production unit, Set up of zooplankton production unit, Identification of ornamental fish diseases; Prophylactic measures for ornamental fish diseases

Attachment: Freshwater fish farm and ornamental fish production (4 weeks)

Introduction and Orientation, Pond Preparation and Management, Stocking and Acclimatization, Water Quality Monitoring, Feeding Management, Health Management, Harvesting Techniques, Practical Setup of Integrated Systems, Management of animal component, Aquatic Plant Management, Biofloc Technology Application, Field Visit to Integrated Farms

6. CCF-116 Course Name: Value Addition of Fish (1+2)

Theory

Introduction to fish processing and value addition. Principles of fish preservation by different processing methods. Theoretical aspects of salting, drying, fermentation, marinades and smoking. Principles and methods of preparation of various fish paste products like fish sausage, fish ham, surimi, fish cake, kamaboko etc. Battered and breaded products- fish finger, fish cutlet, fish ball, fish nugget etc. Diversified fish products- Pickles, fish meat stuffed momos, samosas, crepes etc. Packaging requirement for value added fish products.

Practical

- Preparation of salted fish, dried fish and smoked fish and packaging.
- Preparation of prawn & fish pickles.
- Preparation of fish mince and surimi.
- Preparation of fish sausage, fish nuggets, fish momo.
- Preparation of coated products - fish cutlet, fish finger, fish ball.
- Preparation of fish sandwich.
- Preparation of fish kurkure and fish spirals.

7. **CCF-117Fisheries Business Management (1+2)**

Theory:

Fisheries Economics and Marketing; Economic principles applied to fisheries, Cost-benefit analysis, Financial planning and budgeting, business accounting procedures, Fisheries financial analysis, Farm record keeping, Fisheries risk management and insurance,

Introduction to Fisheries Business Management; Introduction to fish business management-Concept of management, management process (planning, organizing, staffing, leading and controlling), Fisheries Business Planning and Strategy; Components of a business plan, Steps in planning and implementation, new dimensions in fish business environment and policies, Fisheries business evaluation and control.

Introduction to marketing management marketing: Introduction to product marketing, Marketing functions, cost margin, marketing channels, Marketing mix and marketing strategies, product development and product mix, Project formulation.

Practical:

- Estimation of economics of Fisheries Enterprise and breakeven analysis.
- Preparations of projects Fisheries Enterprise.
- Financial analysis (payback period, ROI, NPV).
- Analysis of financial statements (Balance Sheet, Profit loss statement).
- Preparation of business – Strengths Weaknesses Opportunities and Threats (SWOT) analysis.
- Case study of Fisheries Startups/ successful Fisheries Enterprise.
- Government schemes, support and subsidies in fisheries.
- Field study of Fisheries Enterprises and fish markets.

Examination and Evaluation

1. For each course to be offered in first semester, separate theory exam of 100 marks and practical of 100 marks will be conducted and candidate have to obtained minimum passing marks of 50 % in theory and practical exam, separately.

2. In second semester, listed module of farm practice / induction training, will be evaluated by the teacher based on assignments and candidate has to qualify each module with satisfactory grade given by the teacher.

3. Trainees will also be assessed based on group discussions, submission of assignments, presentations, submission of practical records and viva voce etc.

4.Regular attendance for all the courses will be maintained and candidate must have minimum 70 % attendance for appearing in exam.

After completing this programme, participants will be able to:

- Undertake Entrepreneurships/ startups in aquaculture.
- He can start Hatchery for spawn production.
- He can start Nursery seed rearing.
- He can start marketing of farm inputs and products.
- He can start ornamental fish business.
- He can start fish farm advisory services
- Undertake Entrepreneurships in Value added fish products.
- Assist in extension activities in fish farming.
- Assist in data collection and documentation of practices.
- Supervise management of Fish farms.
- Assist in implementation of development programs.
- Candidate can also apply for government/private job for which he is eligible.

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