CERTIFICATE COURSE

OPERATIONAL GUIDELINES FOR CERTIFICATE COURSE

Only a Government can pass ordinance, Try to follow the UGC stipulations for the number of contact hours,

Is this a certificate course or extra credit course?

1. Eligibility for Admission: Candidate who passed 10+2 examination with at least 45% marks in aggregate in Arts / Science / Commerce.
2. The candidate after passing examination will be awarded a separate "Certificate in Ornamental Fish Farming" in addition to his/her regular degree/Detailed Marks Card of B.A., B.Sc. and B.Com.
3. The supplementary examination shall be held in April or as fixed by the Controller of Examination Office.
4. The candidate who doesn't pass in the supplementary examination will be given another chance to appear in above said course along with forthcoming annual examination.
5. A candidate who passed the course in the supplementary examination or in the third chance in annual examination can appear alongside in next subsequent examination of above said course.
6. The candidate who is unable to pass the course in three given chances, will not be allowed to continue the above said course
7. Every candidate will be required to attend minimum of 75% lectures/periods delivered to that class.
8. The candidate must obtain 40% of the total marks in theory and practical separately to pass the course.
9. The candidate must have obtained in House Examination at least 25% marks in the subject.
10. Candidates will be offered English as the medium of Instructions/ Examination

Objectives:

1) To give students knowledge about various techniques of ornamental fish breeding, rearing and its marketing to make them self sustainable after graduation.
2) To teach techniques of construction of glass aquarium and its maintenance.
3) To teach students about fish food production and health related problems with ornamental fish.

Expected outcome: Shake holder knows importance of What is this? The title below is sericulture.

Course Fee: Rs. 800/- [Tuition fee: Rs. 500, Laboratory Fee: Rs. 200, Library Fee: Rs. 100]

SERICULTURE

Semester: **ECC : 1** **Credits:** **Hours : 60 (T) + 15 (P)**

Objectives: To make aware of the graduates about the economic importance of silkworm for income generation and to create a self employment venture.

Expected outcome: Students will know about the sericulture/silk industry and will provide an opportunity to expose them to a cottage industry as well as an employment opportunity.

Unit I: Moriculture **12 Hours**

Morphology, characteristics and varieties of mulberry; Mulberry Cultivation Practices - Site selection, preparation of land and planting materials, maintenance of plants, harvesting and storage of leaf; Pest (sucking pest, leaf folder, root feeders, termite); Diseases -Bacterial, fungal (powdery mildew, leaf spot, leaf rust, leaf blight, root rot) and viral diseases, Symptoms, preventive and control measures.

Unit II: Silkworm larval rearing process **12 Hours**

Mulberry leaf processing - Harvesting, Selection, preservation, cleaning; Sterilization of room & equipments; Larval rearing - young larval and grownup larval rearing; Rearing bed, Cleaning bed

Unit III: Silkworm cocoon and adult sage **12 Hours**

Maintenance of Pre-cocoon, cocoon and spinning stages of silkworm; spinning equipments; physical and chemical nature of silk; Maintenance of adults, seed production, processing of egg, volitisoms,

Unit IV: Pests and diseases of silkworm and their management **14 Hours**

Pests - Life cycle, nature of damage, prevention and control of Indian uzifly, integrated management of Indian uzifly; Cocoon pests of silkworm -Dermestid beetle- life cycle; nature and extent of damage, Prevention and control measures; Protozoan disease – symptomatology, structure of pebrine spore, life cycle of *Nosema bombycid*; Bacterial diseases: Causative agents, symptoms, factors influencing flacherie; Viral diseases - Grasserie, infectious flacherie, cytoplasmic polyhedrosis, densonucleosis and gattine; Fungal diseases - White and green muscardine and aspergillosis

Unit IV: Silk production technology and economics **10 Hours**

Commercial qualities and selection of cocoon for reeling; cocoon processing; reeling (process and appliances) and commercial qualities of silk; Economics of sericulture, cocoon and yarn marketing. Marketing organizations - role of Central Silk Board, Future prospects; Central and state organizations for sericutlrue.

Textbook

1. Ganga, S. G. and Sulochana Chetty, J. 2008. Introduction to sericulture (II Ed.), Oxford and IBH Publishing House, New Delhi.
2. David, B.V. and Ramamoorthy, V.V. 2011. Elements of economic entomology. NP Namrutha Publications, Chennai.
3. Jaiswal, K., 2009. Moriculture. Aph Publishing Corporation, New Delhi.
4. Yasuji Hamamura, 2001. Silkworm Rearing on artificial diet- Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi & Calcutta.
5. Patnaik, R.K., 2008. Sericulture Manual. Astral International Pvt. Ltd., Delhi

R-Resources

1. **http://csb.gov.in/assets/Uploads/documents/note-on-sericulture-2016-17.pdf**
2. **http://csb.gov.in/publications/annual-report/**

Practicals:

1. Planting materials and nursery bed preparation
2. Maintenance of mulberry garden
3. Mulberry varieties
4. Pests of mulberry (sucking pests, Leaf feeders, root feeders)
5. Mulberry diseases.
6. Incubation, egg hatching and brushing of newly hatched larvae
7. Cleaning and feeding trials in early and late instars
8. Mounting (in Chandrik) of final instars for spinning
9. Collection of cocoons, determination of cocoon shell ratio and quality check
10. Sex determination in Adult moths and oviposition
11. Preparation of egg cards
12. Observation of pests and diseases of mulberry (preserved specimens)
13. Observation of pests and diseases of silkworm (preserved specimens)

ORNAMENTAL FISH CULTURE

Semester: **ECC : 2** **Credits:** **Hours : 60 (T) + 15 (P)**

Unit 1: Aquarium **5 hours**

Aquarium accessories - Aerators, filters and lighting; Design, construction, setting and maintenance of fresh water aquarium; Construction of ornamental fish unit.

Selection of ornamental fishes, maintenance of water quality. Handling, care and transportation of fish, oxygen packing, method of packing, anesthetics use.

Unit 2: Identification of common ornamental fishes **12 Hours**

Identification , distribution and biology of common ornamental fishes, fighting fish, Gold fish , koicarp, Gourami, Rosy barbs ,Tetras (Widow tetra, Jewel tetra, Buenos aires tetra, Neon tetra), Angel fish, Red tailed black shark, Bridle shark, cichlids (Oscar, firemouth, zebra, blue morph and Ram cichlid), Live bearer (Moontail molly, sailfin molly, black molly, guppy, platy, redswordtail)

Unit 3: Aquarium plants and Induced breeding **12 Hours**

Importance of Aquarium plants their export potential, Morphology, multiplication of aquarium plants – different methods; Management of ornamental aquatic plants and its trading; Breeding in aquarium fishes -Breeding Habits, Maintenance of brood fishes, Secondary sex characters, Spawning; Induced breeding – Hypophysation, Synthetic hormone (Ovaprim) injection and stripping

Unit4: Food and Feeding **12 Hours**

Culture of live feed organism (Infusorians, Zooplankton, Rotifers, Copepods, Cladocerans, Brine shrimp, Blood worm, Tubifex), Artificial feeds. Methods of fish feeding, balanced diets for aquarium fishes

Unit 5: Disease management and Economics **12 Hours**

Identification of common parasites (argulus, lernaea, nematodes), bacterial, viral, fungal diseases of ornamental fishes and their control and prophylaxis; Economics of ornamental fish culture and trading.

Text Book:

1. Jameson, J.D. and Santhanam. R. 1996, Manual of ornamental fishes and farming, Technologies Peejay, Thoothukkudi.

Reference Books:

1. Rath, R.K. (2000). Freshwater Aquaculture. Scientific Publishers (India). PO Box: 91, Jodhpur.

2. Mohan Kumar. C (2008),Handbook on ornamental fish diseases, MPEDA , India
3. Arumugam, N. (2010), Home Aquarium, Saras Publication
4. **Kholakia, A.D. 2009. ornamental Fish Culture and Aquarium Management,** Daya Publishing House, New Delhi, pp. 313.
5. H.S. Jagtap, S.N. Mukherjee and V.K. Garad, 2018. A Textbook of Pisciculture and Aquarium Keeping, Daya Book Publications, 2018, eighth Edition, PP. 264.

E-Resources

1. https://www.researchgate.net/publication/282759544_Ornamental_Fish-culture_Technologies
2. http://cifa.nic.in/sites/default/files/ORNAMENTAL%20FISH%20CULTURE_0.pdf
3. http://www.ccari.res.in/TB%20No.16.pdf
4. http://www.aces.edu/dept/fisheries/education/documents/Species_Module_Ornamental_Tropical.pdf
5. http://dev.ourworld.unu.edu/international-network-on-water-environment-and-health/unu-inweh-course-1-mangroves/Ornamental-fish.pdf
6. http://nsgl.gso.uri.edu/hawau/hawauw93001/hawauw93001chap6.pdf

Practicals (15 hours):

1. Construction and setting up of glass aquarium
2. Identification of common live bearer ornamental fishes: - Guppy, Molly, Platy, Sword Tail
3. Identification of common Egg layer ornamental fishes: - Angel, Neon tetra, Discus and Siamese fighter, Gold fish, Koi Carp, Danio- Zebra, and Flower Horn.
4. Identification and sexual dimorphism of ornamental fishes
5. Preparation of ornamental fish feed.
6. Setting-up of breeding tank for live bearers
7. Induced breeding
8. Fish feed formulation
9. Identification of ornamental fish diseases and prophylactic measures
10. Identification of aquarium plants
11. Fish farm visit

SEAFOOD PROCESSING

Semester: **ECC :** **Credits:** **Hours : 60 (T) + 50 (P)**

Objectives

The main objective of the programme is to: develop and strengthen human resource by infusing and imparting knowledge and skill in Value Added Fish Products; training of personnel for self-employment and creating awareness and competency in the fish processing as well as fish products preparation; and impart basic knowledge and technical proficiency in Post-Harvest Management, primary processing of fish, value addition, quality control and marketing

Unit 1: Introduction to Fishes and their spoilage **12 hours**

Fisheries and aquaculture industry in India; Categorization of resources -Inland and marine; Fin fishes and shell fishes - salient features, Body structure and functions of various body parts, nutritional and energy values; Composition of fish, Rigor mortis & stages of spoilage; Role of enzyme and bacteria in spoilage of fish, Intrinsic & extrinsic parameters controlling spoilage

Unit 2: Preservation, Packaging, storage of fishes **12 hours**

Preparation of fresh fish for processing; Principles and methods of preservation of fish-Drying, Canning, Salt curing, Smoking, Marinating, Fermentation, Irradiation, MAP & CAP, Freezing, Freeze drying, and Value addition; Packing methods; Types of freezing equipments: Air blast freezer, contact freezers, immersion and spray freezer, Band freezer, Rotary freezer, cryogenic freezer

Unit 3: Functional properties of food components **12 hours**

Functional properties of food components: Emulsification, buffering, water holding, gelling properties of food components; Factors affecting functional properties and food quality. Flavor loss during processing and storage; Common fish spoiling bacteria, Microbial limits in seafood; Hygiene and sanitation in fish processing plants: Good manufacturing practices, Standard sanitary operating procedure, Chlorination and cleaning schedule

Unit4: Fish processing, Quality Assurance **12 hours**

Concepts of Food safety management systems-Quality concepts, HACCP principles, risk assessment methods, quality costs, usefulness of quarantine and certification, guiding and mandatory standards, Role of Food Safety and Standards authority of India; Basic concepts of hygiene and sanitation: Sources of pathogens and food poisoning organisms, Carriers and vehicles of pathogens, conditions for their growth, their interaction with the food, methods of

pathogen inactivation, Effect of disinfectants and principle of their dose calculation, Personal hygiene and periodicity of check

Unit 5: Value added products, Fish marketing & organization 12 hours

Value added products: Fish soup powder, fish pickle, fish cutlet, fish wafers and fish sausage. Fishery by products: chitin and chitosan, Shrimp extract, fish meal, fish body oil and Isinglass; Marketing channels, Types of fish marketing, organization in aquaculture and fish trade

Practical:

1. Evaluation of fish conditions
2. Evaluation of fishery products for organoleptic, chemical and microbial quality
3. Methods for analysis for bacterial quality parameters, chemical parameters and filth
4. Value added products – preparation
5. Industrial visit to fish landing centres and fish processing plants.

Text Books:

1. Gopakumar.K . Text book of Fish Processing Technology, ICAR , New Delhi P.K.
2. Mukhopadhay. 2013. Fish processing technology, Swastik publications,
3. Sen D. P. 2005. Advances in Fish processing Technology, Pub. Allied Publishers Pvt.

Reference Books:

1. T.K.Govindan . Fish Processing Technology –, Oxford &IBH Publishing Company, New Delhi
2. Balachandran.K.K, Post harvest Technology of Fish and Fish products, Daya Publishing House, Delhi
3. Training Manual on Sea food Quality Assurance -CIFT
4. Sen D P , Advances in Fish Processing Technology, Allied Publishers Pvt. Ltd. New Delhi
5. Introduction to Fishery Byproducts -Barlaw

E-resources

1. http://icpe.in/icpefoodnpackaging/pdfs/12_seafood.pdf
2. https://www.nap.edu/read/1024/chapter/7#144
3. http://nptel.ac.in/courses/120108002/module5/lecture9.pdf
4. http://agritech.tnau.ac.in/fishery/fish_valueaddition.html
5. http://www.fao.org/docrep/X5625E/x5625e0f.htm

Overall suggestion;

Clarify whether these are certificate courses or extra credit courses?

Here also the objectives and outcomes of the courses are to be specified even unitwise.