



St. Albert's College (Autonomous)

An initiative of Archdiocese of Verapoly

Affiliated to Mahatma Gandhi University, Kottayam

(Accredited with "A" Grade by NAAC)

Programme Outcomes

Programme Specific Outcomes

Course Outcomes

Research Department of Fisheries and Aquaculture

B.Sc. INDUSTRIAL FISH & FISHERIES

Programme Outcomes

The program is designed to develop skilled technicians in fisheries science with a broad background in the practical and academic skills of finfish and shellfish biology, fish and shrimp pond management, water and soil quality management, finfish, shellfish and invertebrate culture, environmental impact assessment, habitat and stock monitoring, wild stock management, fisheries business management and planning. The well-structured syllabus will make the students versatile and enable them to rightly fit into an array of facets like ornamental fisheries, processing sector, fish capture industry, culture sector and the field of research & development.

Specifically, the graduates will be adept in a number of transferable, analytical and communication skills including:

- The ability to demonstrate sound understanding related to biology, breeding, genetics and nutrition of various cultivable organisms.
- Acquired sufficient skills and knowledge in aquaculture reproduction, hatchery management and applied genetics.
- Gained sufficient knowledge on applying the adaptive management strategies to protect the endemic freshwater and brackishwater fishery resources
- Ability to diagnose aquaculture related diseases and manage health and safety issues in aquaculture ventures.
- Employ scientific techniques, practical skills and management strategies aimed at improving culture resource management.
- Expertise in handling various instruments and technical aspects related to water/soil quality assessment thus resulting in solving issues in connection with quality management in culture systems.
- Skilled to analyse the quality assessment and post-harvest technology to manage live fish and fishery products.
- Exploit and utilize wisely fisheries resources using appropriate and innovative fishing methods
- Apply post-harvest practices that are compliant to international standards for food safety and quality
- Engage effectively in biochemical analyses which are relevant in culture industry.

- Understand and interpret critical scientific and ethical issues related to culture ecosystems and recommend conservatory measures to manage a balanced aquaculture ecosystem.
- Demonstrate research skills and scientific methodologies for further studies, research and employment.
- Gained noesis in fields allied to fisheries economics and extension and engage in activities which will result in sustainable production systems and dissemination of knowledge to the society.
- Have a strong hold in the concepts of management & marketing and develop the capacity to produce innovative ideas & tactical skills required for an entrepreneurial career.

In addition, the students will have the ability to

- Retrieve and present scientific information, including communicating effectively with a variety of audiences in written and spoken form as well as digital format.
- Understand and apply relevant scientific principles and work effectively, cooperatively and productively within a team.
- Critically analyse and evaluate data in fisheries science and creatively solve practical problems.

The entrepreneurial skills of the students are enabled through the different training sessions and they will have the capacity to develop, operate and manage a fishery related business through self entrepreneurship. As the course is more processing industry oriented the students will possess the essential skills required to cater the seafood processing sector.

Program Specific Outcomes

On completion of the B.Sc. Industrial Fish & Fisheries program the students would be skilled in the following specific areas

- Become adept in the concepts of capture, culture and management of fisheries making oneself suitable employment in both the public and private sector.
- Identify and formulate technically sound, economically feasible and socially relevant fishery related projects.
- In depth knowhow of the fishery products and by-products technology to venture into self entrepreneurship.

- Proficient in various aspects of quality control and quality assurance of seafood products enhancing the employability potential in the seafood industry.
- Apply the principles of economics and marketing along with the attained entrepreneurship skills to own business ventures.

Course Outcomes

Core Courses

Semester 1

Biology of Fishes

Course Code - AQU1CRT0117

On completion of the course the students will have attained the following:

- Demonstrate the ability to use their degrees to undertake careers in biology or to gain admittance to post graduate or professional school.
- Demonstrate an understanding of organismal form, function, and diversity.
- Present and discuss key physiological processes in fish.
- Calculate outcomes of physiological processes fish experience during osmoregulation, buoyancy, locomotion, thermal regulation, and respiration.
- Demonstrate a working knowledge of the foundational concepts of biology, including cellular, ecological and evolutionary biology.
- Rigorously and ethically apply the scientific methods to questions in biology by formulating testable hypotheses and gathering and analyzing data to assess the degree to which they support the hypotheses.

Principles and Methods in Aquaculture

Course Code – AQU1CRT0217

On completion of the course the students will have attained the following:

- Clear understanding of the concept of aquaculture on a global and regional perspective.
- Application level comprehension of the concepts of pond ecology.
- Ability to select suitable aquaculture species based on specific criteria.
- Introductory exposure to brackishwater aquaculture systems and mariculture.
- Detailed knowledge of the various international, national and regional fisheries institutions and their functioning.

Freshwater Aquaculture

Course Code – AQU1CRT0317

On completion of the course the students will have gained the following

- Differentiate different form of freshwaters and list the freshwater fish species being cultured and potential species of India.
- Comprehend the status of freshwater aquaculture in India.
- In depth knowledge of the different types of rearing processes and the different steps and procedures involved in the preparation and management of nursery and rearing systems of fish culture.
- Expertise in pre-stocking pond preparation steps such as drying, ploughing, liming, manuring and fertilization and proper procedures for grow out.
- Knowledge on the biology and feeding habits of cultivable carps and types of carp farming systems.
- Knowledge on the culture freshwater prawns, mollusks and frogs.
- Sufficient knowledge of the different systems of aquaculture including recent techniques like aquaponics and recirculatory aquaculture systems.

Core Practical – 1 Biology of Fishes

Course Code – AQU1CRP0117

- Ability to undertake the morphometric measurements of fishes.
- Hands on experience in the mounting of different types of fish scales.
- Skill to identify the commercially important fish species of India.
- Analytical exposure on the feeding behavior of fishes.
- Practical understanding of the technique of prawn appendages.
- Skilled to dissect and display the alimentary canal for fishes and prawns.
- Ability to quantifiably estimate the fecundity and gonado-somatic index of fishes.

SEMESTER – II

Brackishwater Aquaculture and Mariculture

Course Code –AQU2CRT0117

On completion of the course students will be able:

- To develop economically viable and environmentally sustainable culture technologies for finfish and shellfish in brackishwater systems in different agro-ecological regions.
- To meet emerging requirements of brackishwater aquaculture to carry out basic and strategic research.

- To evaluate economically important brackishwater biological resources for their commercial utilization.
- To provide policy and planning support for socio-economic development, through environmentally sustainable, brackishwater aquaculture.
- To undertake human resource development and transfer of technology programmes through training and extension and to provide consultancy services
- Awareness on the environmental impact implications of brackishwater farms and associated social issues.

Hatchery Technology in Aquatic Organisms

Course Code –AQU2CRT0217

On completion of the course the students will be have

- Distinct understanding of the broodstock management, seed production and nursery rearing of carps.
- In depth knowledge of the breeding techniques of common carp seeds as well as the methods of transport of brood fish and fish seed.
- Clear understanding of the seed production and nursery rearing of commercially important cultivable fishes, crustaceans and mollusks.
- Demonstrable skills on the design of shrimp hatcheries.

Fishing Methods

Course Code – AQU2CRT0317

On completion of the course the students will have attained

- In depth knowledge of the types of fishes crafts in India as well the traditional, motorized and mechanized fishing vessels.
- Clear understanding of the limitations of indigenous craft and advantages of mechanized craft.
- Ability to explain the traditional and modern fishing gears operated in India.
- Able to discuss the different types of synthetic materials used in the construction of fishing gears.
- Ability to demonstrate the design of fishing gear systems both active and passive.
- Thorough knowledge on the importance of fish aggregating devices, artificial reefs and by-catch reduction devices and their contribution to stock replenishment.
- Awareness on the significance of implementing responsible fishing and supporting legislations.

PRACTICAL

Practical - Taxonomy, Fisheries and Fishing Technology

Course Code – AQU2CRP0117

- Skill to identify the larval forms of fishes, penaeid and non-penaeid shrimp.
- Ability to identify the traditional and modern fishing gears.
- Able to identify various fishing accessories, synthetic and natural fibers.
- Practical exposure on the deck arrangement and fish detection devices on mechanized fishing vessels.
- Analytical skills to graphically represent fish catch statistics.

SEMESTER – III

Inland and Marine Fisheries

Course Code – AQU3CRT0117

On completion of this paper the students will be able to expand their expertise in the wide areas related to inland and marine fisheries. They could easily describe and assess various related subtopics and few of them are listed below:

- Explain on different aspects about the current status, classification, fish and fishery resources and types of capture and culture practices employed in various Inland (cold water and riverine systems), reservoirs, estuaries as well as marine water bodies in India.
- Discuss and justify points on and various problems encountered by these major water bodies and also disseminate on different schemes practiced for the development of the same.
- Demonstrate a sound understanding on various regulations and policies for assessment and conservation of fishery resources.

Biostatistics and Computer Applications

Course Code – AQU3CRT0217

Upon completion of the course the students will have attained the following

- Ability to present the statistical data in order to comprehend the complicated practical field scenarios.
- Decision making ability with application of computer based data presentation and analytical tools

- Understanding of data distribution pattern and their application in construction filed scenarios.
- Ability to establish to linear relationship among variables of given data set and deriving model regression for better predictability.
- Ability to perform various numerical data process on Microsoft office.
- Develop measures that can be used to summarize a data set: mean, median, mode, percentiles, variance, standard deviation, and range.
- Develop measures that can be used to indicate the amount of variation in the data set- percentiles, variance, standard deviation, and range.
- Know how to use sample data to estimate a population mean, a population variance, and a population proportion and know how to compute point and interval estimates of the population parameters.
- Estimation of total marine fish landings

Aquaculture Nutrition

Course Code – AQU3CRT0317

Upon course completion the students will have attained the following:

- Possess detailed knowledge of the principles of fish nutrition in addition to the role of different types of nutrients and feed additives.
- Ability to track the quality and quantitative importance of feed preparation for production of farmed fishes where they can understand the ratios between the energizing nutrients in commercial feeds.
- Attain knowledge on various micro and macro nutrients their absorption, metabolism and biochemical functions.
- Students can explain the components of fish feed and fish product quality, both positive (nutrient) and negative (contaminants from food and environment).
- Thorough understanding of feed manufacturing procedures, equipments, feed transport and feed storage from a quality standards perspective.
- In-depth Knowledge on feeding strategies, feed energetics and quality standards.

Practical - Biostatistics and Computer Applications

Course Code – AQU3CRP0117

- Ability to present the statistical data in order to comprehend the complicated practical filed scenarios.

- Acquired skills in complex statistical analyses to handle a variety of practical problems using modern statistical techniques.
- Decision making ability with application of computer-based data presentation and analytical tools.
- Skill to measures that can be used to summarize a data set: mean, median, mode, percentiles, variance, standard deviation, and range.
- Ability to perform numerical data processing on Microsoft office.
- Ability to find information and collect data on fisheries by online database

SEMESTER – IV

Genetics and Biotechnology

Course Code –AQU4CRT0117

Upon completion of the course the students will have attained

- A strong hold on the fundamentals of genetics and fish genetics.
- Greater insight into the molecular techniques and various gene manipulation techniques so that they could cater to the needs of the aquaculture sector and equip themselves with the current advanced technologies for their future career development.
- Ability to apply the knowledge from this particular course for their own research and extension projects and develop a critical thinking for the fast-developing genetic modifications in both fisheries and aquaculture.
- Understand and tap great potential of the vast ocean in catering to the human needs especially in the pharmaceutical and industrial chemical sector and open doors for further exploration.

Pathology in Aquaculture

Course Code –AQU4CRT0217

Upon successful completion of the course the students should be able to

- Understanding the various diseases in fishes and diagnostic methods.
- Develop a basic knowledge of fish immunology and prevention of fish diseases.
- Thorough knowledge in the field of diseases in various species of fishes caused by infectious and non-infectious agents.
- Clear knowledge of the new method of prevention and therapy of fish diseases in culture systems.

- Necessary skill and knowledge in animal health in relation between host, pathogen and the environment.
- Sufficient knowledge on diseases management tools and ecological impacts of diseases in aquatic environment.
- Expertise in traditional and new molecular approaches to diseases diagnosis

Aquariculture

Course Code –AQU4CRT0317

Upon completion of the course the students will have attained the following

- Expertise in the design and construction of home and public aquaria
- Knowledge on setting and maintaining aquariums in addition to water quality management.
- Knowledge on handling and transport of aquarium fishes for trade and research purposes.
- In depth knowledge on the breeding, larval rearing and health management of freshwater ornamental fishes.
- Gained know-how for aquariums plant management including their mass production techniques.
- Technically skilled to develop commercial units for ornamental fish production.
- Thorough knowledge of marine ornamental fishes, wild stock availability, transport and breeding for commercial gain.
- Sufficient technical know-how for ornamental fish nutrition and disease management.

Practical - Breeding and Rearing of Aquarium Fishes

Course Code- AQU4CRP0117

- Ability to identify fresh water and marine ornamental fishes, invertebrates and plants.
- Hands on experience in breeding and seed production of ornamental fishes.
- Skilled in aquarium setting and maintenance.
- Maintain water quality and regular check on water quality parameters.
- Identify and monitor the health of species and recognition of disease by observing symptoms.
- Expertise in aquarium plant rearing and propagation and the role of aquarium plants in maintaining water quality in aquarium.

SEMESTER – V

Larval Nutrition and Culture of Fish Food Organisms

Course Code –AQU5CRT0117

- Easily involve in preparation, processing, formulation and proximate composition of feed
- Understand various aspects related to physical properties of feed such as sinking velocity, bulk density, water absorption etc.
- Gain sufficient knowledge in the culture of phytoplanktons and zooplanktons and their applications in hatcheries.
- Clear understanding of artemia culture, storage and feeding and applications of live feeds.

Fishery Microbiology

Course Code –AQU5CRT0217

Upon successful completion of the course student should be able to

- Explain the interactions between microorganisms and fishes and factors influencing their growth and survival.
- Explain the significance and incidence of microorganisms in fishery environment.
- Describe the characteristics of food born and spoilage causing microorganisms in fishery products and methods for their isolation, detection and identification.
- To develop basic knowledge on the general principles of microbiology techniques.
- To develop knowledge about biology and epidemiology of food borne microorganisms of public health significance including bacteria, yeast, fungi, protozoa and viruses.
- To know the structure, classification, characteristics and economic importance of viruses bacteria and fungi.
- To develop understanding about the historical landmarks in the development of microbiology and the classification of microorganisms.
- To develop understanding about the role of microorganisms in biogeochemical cycles.

Open Course

Value Added Fishery Products

Course Code –AQU5COC0217

On completion of the course students would be able to:

- Awareness on the principles and significance of value addition in the seafood industry.
- Technically efficient to prepare fish mince-based products with special emphasis on surimi production.
- Thorough knowledge of the preparation, packaging and storing as well as quality evaluation of coated fishery products.
- Capacity to understand the preparation of a number of other value-added products such as pickles, wafers, chutney powders, steaks, cutlets etc. from fish or shrimp.
- Ability to prepare by products like chitin, chitosan, fish silage, fish meal, fish oil etc. for commercial gain.
- Sufficient knowledge on spoilage and quality evaluation in thermally processed products.

Practical 1 Fishery Microbiology and Pathology

Course Code –AQU5CRP0117

- Thorough understanding of fundamental sterilization techniques.
- Ability to work with standard lab safety protocols and procedures.
- Developing skill in preparation of and viewing samples for microscopy, use appropriate methods to identify microorganisms, estimate the number of microorganisms in a sample, and use common lab equipment.
- Ability to practice safe microbiology, using appropriate protective and emergency procedures.
- Use of standard methods and procedures for the microbiological analysis
- Understanding the practical skills in microscopy and their handling techniques and staining procedures.
- Clear understanding the various diseases in fishes and diagnosis methods.
- Basic knowledge in the field of diseases in various species of fishes caused by infectious and noninfectious agents.
- Familiarity with the new methods of prevention and therapy of fish diseases in culture systems.
- Thorough knowledge on diseases management tools and ecological impacts of diseases

in aquatic environment.

Practical 2 Aqua Farm Management

Course code- AQU5CRP0217

- Ability to identify various commercially important shell fishes and finfishes by using morphological characters.
- Expertise in plankton identification methods.
- Mastery on hatchery construction and familiarity with equipment operation
- Calculating nutrient requirement in feed formulation using standardized methods
- Hands on experience in culturing and marketing live feeds

SEMESTER – VI

Fisheries Management

Course Code- AQU6CRT0117

On course completion the students will be

- Adept in the principles of management and the scientific techniques of management
- define and use newly acquired terms and concepts related to fisheries and fisheries management
- Clear understanding of human resource management in the fisheries business environment.
- Adept in the management techniques and regulatory mechanisms in the processing sector.
- Thorough knowledge on the legislations relating to the management of the fisheries sector at the national level and state level
- In depth knowledge on principles and economics of the fish markets,
- Thorough knowledge on the exploitation, management and conservation of varied fishery resources.
- Expertise in organizational setup and state and central support to the processing industry.
- Ability to explain the concept of marketing management including distribution channels and price determinants.
- In depth understanding of the principles of cooperatives, types of cooperatives, issues and their role in the development of the fisheries sector.
- Ability to understand the concept of management of fishery resources at the application level.
- Explain and compare the different approaches, techniques and measures employed to

manage fish stocks in sustainable manner.

- Discuss and justify the use of various types of knowledge and sources of information applied in the decision-making processes of fisheries management

Fish Processing Technology and Quality Control

Course code AQU6CRT0317

This course will acquaint students with basic principles of common seafood preservation techniques, non-thermal food processing techniques, quality assurance and export of fish and fishery products.

On completion the students will be able to

- To understand and develop skills on various seafood processing techniques and seafood export documentation.
- Capacity to analyse and interpret quality assurance and management of the system in seafood industries.
- To develop the skill to differentiate fresh and spoiled seafood. To understand the post-mortem quality degradation in seafood.
- To understand the methods to prevent seafood spoilage.
- To have knowledge on advanced techniques of packaging and storing of seafood products.

Fisheries Economics and Marketing

Course Code AQU6CRT0317

On completion the students will have

- A clear understanding of the importance of economics in aquaculture development
- A clear picture of the employment potential of the fishing industry
- The ability to relate the socio-economics impacts with rural development
- A deeper knowledge on the marketing of fishery products and export earnings
- The ability to contribute ideas towards planning for fisheries development in the country
- A clear understanding of the role and effectiveness of the function of fisheries cooperatives in the country

Choice Based Course

Fishery By – Products

Course Code – AQU6CBT0217

On successful completion of the course students will be able:

- Awareness on the principles and significance of value addition in the seafood industry.
- Technically skilled to prepare fish mince-based products with special emphasis on surimi production.
- Thorough knowledge of the preparation, packaging and storing as well as quality evaluation of coated fishery products.
- Capacity to understand the preparation of a number of other value-added products such as pickles, wafers, chutney powders, steaks, cutlets etc. from fish or shrimp.
- Ability to prepare by products like chitin, chitosan, fish silage, fish meal, fish oil etc. for commercial gain.

PRACTICAL

Fish Processing Technology and Quality Control

Course Code –AQU6CRP0117

- Knowledge and preprocessing skills such as filleting of fishes, preprocessing of shrimp, moisture determination etc.
- Attained skills on various seafood processing techniques such as freezing and drying.
- Skilled to differentiate fresh and spoiled fishes.
- Capacity to analyze and interpret quality assurance and preprocessing aspects of seafood industries.
- Knowledge and skills in waste utilization in seafood processing.
- Skilled to generate value added seafood products.

Water and Soil Quality Parameters

Course Code – AQU6CRP02

- Ability to perform quantitative analysis of various physical, chemical and biological parameters of the water body.
- Expertise in sampling and analytical skills in soil and water quality required in environmental monitoring.

- Familiarity with various standard protocols used in environmental monitoring.
- Practical skills to use the contemporary tools and techniques required for environmental impact assessment.
- Ability to carry out basic and strategic research emerging areas of environmental hazards and pathogenicity of aquatic organisms.
- Ability to address different aspects of water resource management, legal and economic issues associated with environmental hygiene.
- To create awareness on the importance of different water and soil quality parameters to convert aqua-farming operations into a profitable venture.