HIGHER UNIVERSITY TECHNICIAN IN AQUACULTURE
PROJECTS SPECIALIST
PROFESSIONAL COMPETENCIES

FISH CULTIVATION COURSE

LEARNING UNITS

1. Competencies	To develop sustainable aquaculture projects, based on market needs and established regulations, to contribute to the development of the sector.
2. Four Month Period	FIFTH
3. Theoretical Hours	35
4. Practical Hours	95
5. Total Hours	120
6. Week Total Hours Four Month Period	8
7. Course Objective	The student will cultivate fish, through specialized techniques, to contribute to the development of the regional aquaculture sector.

Learning Units	Hours		
	Theoretical	Practical	Total
I. Introduction to fish cultivation	10	10	20
II. Freshwater fish cultivation	10	30	40
III. Marine fish cultivation	15	45	60
Total	**35**	95	120

FISH CULTIVATION

LEARNING UNITS

1. Learning Unit	I. **Introduction to fish cultivation**
2. Theoretical Hours	10
3. Practical Hours	10
4. Total Hours	20
5. Objective of the Learning Unit	The student will distinguish the morpho-physiological characteristics of the main freshwater and marine fish, for their aquaculture exploitation.

Themes	Learning to know	Learning to do	Learning to be
Background and the importance of fish.	To describe historical aspects and ecological, economic and social importance of fish cultivation.		Organized Methodical Honest Ethical Responsible
Systematics.	To identify the main groups of fish of aquaculture interest and their characteristics.	To distinguish species of aquaculture importance at the species level.	Organized Methodical Honest Ethical Responsible
Fish morpho-physiology.	To describe the morpho-physiological characteristics of freshwater and marine fish: respiration, movement, reproduction, growth, development and parental care. To explain the life cycle of fish.		Organized Methodical Honest Ethical Responsible

FISH CULTIVATION

EVALUATION PROCESS

Learning Outcomes	Learning Sequence	Instruments and types of reagents
To prepare a catalog of fish of aquaculture importance that contains: - Taxonomic category. - Description of the morpho-physiological characteristics. - Photographs and schemes.	1. To identify the types of fish and their historical background of aquaculture exploitation. 2. To identify the morpho-physiological characteristics of fish of aquaculture importance. 3. To understand the life cycle of fish of aquaculture importance.	Essay Checklist

FISH CULTIVATION

TEACHING LEARNING PROCESS

Methods and teaching techniques	Media and didactic materials
Research tasks Collaborative teams Field trips with in situ practice	Projector Computer Internet Whiteboard Material for fish collection Classification guide Dissection equipment

LEARNING SPACE

Classroom	Laboratory / Workshop	Company
	X	

FISH CULTIVATION

LEARNING UNITS

1. Learning Units	**II. Freshwater fish cultivation**
2. Theoretical Hours	10
3. Practical Hours	30
4. Total Hours	40
5. Objective of the Learning Unit	The student will cultivate freshwater fish at all stages of development, for production and marketing.

Themes	Learning to know	Learning to do	Learning to be
Breeder conditioning.	To explain the characteristics, parameters and techniques of selection and maturation of freshwater fish breeders.	To select freshwater fish according to their morphological and genetic characteristics. To condition freshwater fish towards reproduction.	Organized Methodical Honest Ethical Responsible
Reproduction.	To explain the characteristics, parameters and techniques of induction to spawning and fertilization of various freshwater fish of aquaculture importance.	To induce the spawning and fecundation of freshwater fish.	Organized Methodical Honest Ethical Responsible
Incubation and nursery	To explain the characteristics and parameters of egg and alevin management techniques in the cultivation of freshwater fish.	To manage the eggs and alevins of freshwater fish.	Organized Methodical Honest Ethical Responsible
Pre-fattening.	To explain the characteristics, parameters, methods and techniques of pre-fattening of freshwater fish.	To perform the pre-fattening of freshwater fish.	Organized Methodical Honest Ethical Responsible

Themes	Learning to know	Learning to do	Learning to be
Fattening.	To explain the characteristics, parameters, methods and techniques of fattening of freshwater fish.	To perform the fattening of freshwater fish.	Organized Methodical Honest Ethical Responsible

FISH CULTIVATION

EVALUATION PROCESS

Learning Outcomes	Learning Sequence	Instruments and types of reagents
From a practical case of cultivation of freshwater fish, the student will integrate the technical report that should include: - Description of the species and cultivation techniques applied in each of the phases of the crop: - Conditioning. - Reproduction. - Egg. - Alevin. - Pre-fattening. - Fattening. - Logbook according to the manual of good practices - Schemes and photographs. - Discussion and conclusions, contrasting the results with the parameters of the manual of good practices.	1. To understand the procedures and criteria for the selection and maturation of fresh water fish. 2. To understand the procedures of spawning and fertilization of fresh water fish. 3. To understand the procedures of the stages of development from the egg to pre-fattening of fresh water fish. 4. To understand the procedures of pre-fattening and fattening of freshwater fish.	Practical exercises. Checklist.

FISH CULTIVATION

TEACHING LEARNING PROCESS

Methods and teaching techniques	Media and didactic materials
Research tasks Collaborative teams Field trips with in situ practice	Projector Computer Internet Whiteboard Fresh water and salt water quality kits Secchi disc Refractometer Oximeter Thermometer Stereoscope Potentiometer Laboratory equipment Buckets Laboratory glassware Transportation and maintenance equipment

LEARNING SPACE

Classroom	Laboratory / Workshop	Company
		X

WRITTEN BY:	Committee of Directors of the Career of Advanced University Technician in Aquaculture.	**REVISED BY:**		
APPROVED BY:	C. G. U. T.	**EFFECTIVE DATE:**	September 2009	

FISH CULTIVATION

LEARNING UNITS

1. Learning Unit	**III. Marine fish cultivation**
2. Theoretical Hours	15
3. Practical Hours	45
4. Total Hours	60
5. Objective of the learning unit	The student will cultivate marine fish in all its phases of development, for its production and commercialization.

Themes	Learning to know	Learning to do	Learning to be
Breeder conditioning.	To explain the characteristics, parameters and selection and maturation techniques of marine fish broodstock.	To select marine fish according to their morphological and genetic characteristics. To condition marine fish towards reproduction.	Organized Methodical Honest Ethical Responsible
Reproduction.	To explain the characteristics, parameters and techniques of induction to spawning and fertilization of various marine fish of aquaculture importance.	To induce the spawning and fertilization of marine fish.	Organized Methodical Honest Ethical Responsible
Incubation and nursery.	To explain the characteristics and parameters of egg and alevine management techniques in the culture of marine fish.	To manage the eggs and alevins of marine fish.	Organized Methodical Honest Ethical Responsible
Pre-fattening.	To explain the characteristics, parameters, methods and techniques of pre-fattening of marine fish.	To perform the pre-fattening of marine fish.	Organized Methodical Honest Ethical Responsible

Themes	Learning to know	Learning to do	Learning to be
Fattening.	To explain the characteristics, parameters, methods and techniques of fattening marine fish.	To perform the fattening of marine fish.	Organized Methodical Honest Ethical Responsible

FISH CULTIVATION

EVALUATION PROCESS

Learning Outcomes	Learning Sequence	Instruments and types of reagents
From a practical case of marine fish culture, the student will integrate the technical report that should include: - Description of the species and the cultivation techniques applied in each of the phases of the crop: - Conditioning - Reproduction - Egg - Alevin - Pre-fattening - Fattening - Logbook according to the manual of good practices. - Schemes and photographs. - Discussion and conclusions, contrasting the results with the parameters of the good manual practices.	1. To understand the procedures and criteria for the selection and maturation of marine fish. 2. To understand the procedures of spawning and fertilization of marine fish. 3. To understand the procedures of the stages of development from the egg to the pre-fattening of marine fish. 4. To understand the procedures of pre-fattening and fattening of marine fish.	Practical exercises Checklist

FISH CULTIVATION

TEACHING LEARNING PROCESS

Methods and teaching techniques	Media and didactic materials
Practical exercises Collaborative teams Field trips with in situ practice	Projector Computer Internet Whiteboard Freshwater and salt water quality kits Refractometer Secchi disc Oximeter Thermometer Stereoscope Potentiometer Laboratory equipment Buckets Laboratory glassware Transportation and maintenance equipment

LEARNING SPACE

Classroom	Laboratory / Workshop	Company
	X	

FISH CULTIVATION

CAPACITIES DERIVED FROM THE PROFESSIONAL COMPETENCES TO WHICH THE COURSE CONTRIBUTES

Capacity	Performance Criteria
To program the activities of the reproductive cycle, according to the biology of the species, the demand of the product and the climatic conditions, to optimize the resources and to fulfill the production goals.	To prepare a program of the productive cycle based on the manual of good practices for the respective species and that should contain: - planting period (climatic and biology of the species) - morphometric measurements of organisms - homogenization of sizes of organisms - harvest period - feeding schedules - water quality monitoring - water refills - disinfection activities of the infrastructure and of the system - acquisition of supplies
To supervise the reproduction process in aquaculture systems through the methodology corresponding to each species, considering the manual of good practices, to obtain the larvae, post-larvae and offspring.	The student integrates a reproduction log according to the manual of good practices and reproduced species where it reports the following data: - selection of reproducers - number of reproducers (males and females) - reproductive density in systems, degree of gonadal maturation - physicochemical parameters of reproduction systems - data for statistical control (date, time, number of the pond, number of eggs, biometrics, percentage of survival)
To direct the sowing process, through the methodology corresponding to each species and considering the manual of good practices, to start the production cycle and avoid economic losses.	To prepare a report on the transportation, arrival and sowing process based on the manual of good practices, including: - Transportation: conditions of reception of the organisms, number of organisms, size, weight, temperature, oxygen, legal documentation, preventive treatments, method and time of transport. - Arrival at the farm: methodology

Capacity	Performance Criteria
	tempering, number of organisms, weight, sizes, planting densities, preventive treatments. - Planting method.
To verify the process of fattening of aquaculture organisms, through biometric techniques, health, safety and nutrition, based on the manual of good practices to contribute to the performance and quality of aquaculture production.	The student integrates logbooks of the fattening process of aquaculture organisms, based on the manual of good practices, including: - Morphometric records. - Records of physicochemical parameters of water quality. - Observations of the signs of internal or external injuries, diseases and behavior alterations. - Record of feeding (percentages of protein, food ration, feed conversion and pellet size). - Mortality records. - Preventive, corrective treatments and adjustments.
To supervise the process of harvesting aquaculture products based on the established program, the methods and techniques corresponding to the species and the manual of good practices, to meet the requirements of the organization and the market.	To prepare a report on the process of harvesting aquaculture products, based on the manual of good practices, specifying: - Harvesting techniques according to the species and stage of development. - Indicators of compliance with the goals or objectives of the organization. - Analysis and interpretation of indicators. - Conclusions and recommendations.
To evaluate the environmental impact of the sustainable aquaculture project through a study with reference to the applicable regulations, to establish the remediation and mitigation measures and obtain the respective approval.	To prepare an Environmental Impact Statement for an aquaculture project that includes: - General information about the project, the promoter and the person responsible for the environmental impact study - Project description. - Linkage with the applicable legal systems in environmental matters, where applicable, with the regulation on land use. - Description of the environmental system and identification of the environmental problems detected in the area of influence of the project - Identification, description and evaluation of environmental impacts. - Preventive measures and mitigation of environmental impacts. - Environmental forecasts and, where appropriate,

Capacity	Performance Criteria
	evaluation of alternatives. - Identification of the methodological instruments and technical elements that support the indicated information.

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