HIGHER UNIVERSITY TECHNICIAN IN AQUACULTURE
PROJECTS SPECIALIST
COURSE SYLLABUS WITH BREAKDOWN OF THEMATIC UNITS

1. Course	**Introduction to Ecology**
2. Competencies	To direct the production of auxiliary organism cultured, based on the evaluation of the conditions of the Aquaculture systems, to contribute to the profitability of the organization.
3. Fourth Month Period	Second
4. Practical hours	33
5. Theoretical Hours	27
6. Total Hours	60
7. Week Total Hours Four Month Period	4
8. Course Objective	The student will identify the principles of Biology and Ecology, through the analysis and characterization of its elements, to interpret the interactions within the Aquaculture Systems.

Theme Units	Hours		
	Practical	**Theoretical**	**Totals**
I. Fundamentals of the Biological Sciences	8	17	25
II. Fundamental of Ecology.	25	10	35
Totals	**33**	**27**	**60**

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THEMATIC UNITS

1. Theme Unit	**I. Fundamental of the Biological Sciences**
2. Practical Hours	8
3. Theoretical Hours	17
4. Total Hours	25
5. Objective	The student will characterize the species and environments susceptible to Aquaculture exploitation, to contribute to the Aquaculture development of his/her region.

Themes	Learning to know	Learning to do	Learning to be
Life and its organization.	To explain the basic concepts of Biology, such as: - Levels of organization, - Origin of life. - Cell biology - Energy flows, biosynthesis and nutrition.		Analytical. Honest. Methodical. Proactive Enthusiastic. Responsible. Ethical.
Genetics and Evolution	To explain the basic concepts of genetics and evolution - Principles of genetics (Mendel) - Biological classification (Systematics, taxonomy, binomial nomenclature, the five kingdoms) - Principles of evolution (mega-evolution, micro-evolution, speciation, biogeography, distribution of living beings).	To classify organisms of aquaculture importance at the level of order based on their morphological and taxonomic characteristics.	Analytical. Honest. Methodical. Proactive Enthusiastic. Responsible. Ethical.

Themes	Learning to know	Learning to do	Learning to be
Oceanic and terrestrial basins	To identify the origin, classification and characteristics of oceanic and terrestrial basins useful for Aquaculture.	To characterize the oceanic and terrestrial basins of your region, that are useful in Aquaculture.	Analytical. Honest. Methodical. Proactive Enthusiastic. Responsible. Ethical.

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Evaluation Process		
Learning Outcomes	**Learning Sequence**	**Instruments and type of reagents**
To prepare a report that includes: -A conceptual map of the basic concepts of Biology and their relationship. - Map of the region specifying: ✓ the characteristics and terrestrial and oceanic basins ✓ Organisms of importance to aquaculture characterized at the level of order.	1. To understand the basic concepts of Biology. 2. To understand the fundamentals of genetics and the evolution of biological systems. 3. To relate the concepts of the taxonomy of the groups that are important in Aquaculture. 4. To differentiate the characteristics of the terrestrial and ocean basins. 5. To identify the main terrestrial and ocean basins useful in aquaculture in your region.	Essays. Checklists

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Teaching Learning Process	
Methods and teaching techniques	**Media and didactic materials**
Research. Laboratory practice Assisted Reading	Computer Projector Whiteboard Markers Laboratory equipment Internet

Learning Space		
Classroom	**Laboratory / Workshop**	**Company**
	X	

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INTRODUCTION TO ECOLOGY

THEMATIC UNITS

1. **Theme Unit**	**II. Fundamentals of Ecology.**
2. Practical Hours	25
3. Theoretical Hours	10
4. Total Hours	35
5. Objective	The student will identify the basic principles of Ecology, for its application to the production of aquatic systems.

Themes	Learning to know	Learning to do	Learning to be
Species, Population and Community	To describe the concepts of species, population and community from the perspective of Aquaculture. To identify the elements and fundamental characteristics of aquaculture communities: number of populations, interactions, population arrangement.	To characterize aquatic communities.	Analytical. Honest. Methodical. Proactive Enthusiastic. Responsible. Ethical.
Ecosystems & Interactions	To describe the concepts of biomes, ecosystem, habitat and ecological niche. To explain the importance of ecosystems in the maintenance of life. To describe the types of biological interactions: inter and intraspecific and trophic chains. Explain the importance of interactions in the dynamics of biological systems.	Characterize an ecosystem and its interactions.	Analytical. Honest. Methodical. Proactive Enthusiastic. Responsible. Ethical.

Themes	Learning to know	Learning to do	Learning to be
Contamination, pollution and eutrophication.	To describe the concepts of contamination, pollution and eutrophication To identify the origin and causes of contamination and pollution in aquatic systems.	To determine possible causes of contamination, pollution and eutrophication of an ecosystem.	Analytical. Honest. Methodical. Proactive Enthusiastic. Responsible. Ethical.

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Evaluation Process		
Learning Outcomes	**Learning Sequence**	**Instruments and type of reagents**
From a case of an aquaculture system, will produce a report that includes: - Characterization of aquaculture communities. - Characteristics of the ecosystem and interactions. - Possible causes of pollution, pollution and eutrophication.	1. To understand the concepts of species, population, community, contamination, pollution and eutrophication. 2. To identify the characteristics of aquaculture communities 3. To understand the characteristics of an ecosystem and its importance in the maintenance of life.	Case Study. Checklist.

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Teaching Learning Process	
Methods and teaching techniques	**Media and didactic materials**
Field trips with in situ practice Research tasks Collaborative teams	Computer Projector Whiteboard Markers. Laboratory equipment Internet Boats Binocular Camera Boots Quadrant GPS Bottles for collection of organisms Field equipment

Learning Space		
Classroom	**Laboratory / Workshop**	**Company**
	X	

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CAPACITIES DERIVED FROM THE PROFESSIONAL COMPETENCES TO WHICH THE COURSE CONTRIBUTES

Capacity	Performance Criteria
To diagnose the conditions of aquaculture systems through physicochemical and biological analysis techniques and historical records, to ensure the health, innocuousness and profitability of the production.	To prepare a report about the conditions under which an aquaculture system is found, that includes: - The steps for obtaining and processing the samples and their justification. - The analysis and interpretation of information (logs, histories, results analysis, laboratory reports). - Conclusions and recommendations.
To schedule aquaculture system conditioning activities, the product demand and climatic conditions, to optimize resources and meet production goals.	To elaborate a program of the productive cycle based on the manual of good practices that includes: - water quality monitoring - water refills - disinfection activities of the infrastructure and the system - acquisition of supplies
To supervise the operations of production of auxiliary organism cultured, based on the manual of good practices, the characteristics of the species, to obtain live food.	To write a production log with the following data: - species - density of organisms - physicochemical parameters of production systems - data for statistical control (date, time, number of pond, percentage of survival) - harvesting techniques - indicators of compliance with goals and interpretation - Conclusions and recommendations

Capacity	Performance Criteria
To supervise the operations of production of auxiliary organism cultured, based on the manual of good practices, the characteristics of the species, to obtain live food.	To elaborate a program of the productive cycle based on the manual of good practices for the respective species or species and that includes: - planting period (climatic and biology of the species) - morphometric measurements of the organisms - homogenization of sizes of the organisms - harvest period - feeding schedules - water quality monitoring - water refills - disinfection activities of the infrastructure and the system - acquisition of supplies
To program the activities of the productive 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 write a reproduction log according to the manual of good practices and reproduced species where it reports the following data: - selection of reproductive species - number of reproductive species (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 supervise the reproduction process in aquaculture systems by means of the methodology corresponding to each species, considering the good management practices, for obtaining larvae and post-larvae and offspring.	To prepare a report on the transportation, arrival and sowing process based on the good practices manual, that includes: - Transportation: conditions of reception of organisms, number of organisms, size, weight, temperature, oxygen, legal documentation, preventive treatments, method and time of transport. - Arrival at the farm: tempering methodology, number of organisms, weight, sizes, planting densities, preventive treatments - Planting method.

Capacity	Performance Criteria
To direct the sowing process through the methodology corresponding to each species and considering the good management practices, to start the production cycle and avoid economic losses.	To write a log of the fattening process of aquaculture organisms, based on the good practices, that includes: - 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, and corrective treatments and adjustments.
To verify the fattening process of the aquaculture organisms through biometric, health, innocuousness and nutrition techniques, based on the good practices to contribute to the performance and quality of aquaculture production.	To prepare a report on the harvesting process of aquaculture products, based on the 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 supervise the process of harvesting aquaculture products based on the established program, the methods and techniques corresponding to the species and the good practices, to meet the requirements of the organization and the market.	To prepare a technical report on the regional context of the aquaculture sector, describing the following aspects: - Social character of the population: composition, mortality rate, fertility, growth, education, migration, economically active population. - Economic nature: productive sectors, GDP, economic activities, - Physical-environmental character: geographical, biological, climatological characterization. - Normative character: applicable regulations - Opinion on the possibility for developing aquaculture projects.

Capacity	Performance Criteria
To diagnose the environment, social, economic, physical environmental and normative according to the criteria of regional diagnostic study, to identify the possibility of developing aquaculture projects	To prepare a report that reflects the productive potential of the sustainable aquaculture project, which should include: - Location and specific description of the project site - Infrastructure and equipment - The species to work with - The processes and technologies to be used. - The capacity of processes and production programs. - Scenarios with different processes of volumes. - Programs of execution, administrative, training and technical assistance. - Applicable regulatory framework. - Project production and investment costs. - Final Report on the technical feasibility of the project.

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Cortes, H. S.	(1993)	*Manual de Zoología*	Texcoco	Mexico	Chapingo
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Mijares, A y F. Javier	(2005)	*Fundamentos de Hidrología de superficie*	Mexico	Mexico	Limusa
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Hicman C. P. Et al	(2006)	*Principios integrales de zoología*	Madrid	Spain	Mc Graw Hill
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