


COURSE CULTURE OF CRUSTACEANS

LEARNING UNITS

1. Competencies	Coordinate aquaculture production, based on established production systems and under a sustainable scheme, to contribute to the profitability of the organization, preserve and improve the social, economic and environmental surroundings.
2. Four Month Period	Fourth
3. Practical Hours	80
4. Theoretical Hours	40
5. Total Hours	120
6. Week Total Hours Four Month Period	8
7. Course Objective	The student will cultivate crustaceans of commercial interest, through specialized techniques, to contribute to the development of the regional aquaculture sector.

Theme Units	Hours		
	Theoretical	Practical	Total
I. Introduction to Crustaceans Cultivation	10	20	30
II. Cultivation of Decapod	30	60	90
Totals	40	80	120


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LEARNING UNITS

1. Theme Unit	I. Introduction to Crustaceans Cultivation.
2. Theoretical Hours	10
3. Practical Hours	20
4. Total Hours	30
5. Objective of the Learning Unit	The student will distinguish the morpho-physiological characteristics and importance of the main crustaceans, for their aquaculture exploitation.


Themes	Learning to know	Learning to do	Learning to be
Background and importance of crustaceans.	To describe historical aspects about the use of crustaceans and their importance for mankind.		Synthesis and analysis ability. Punctual Systematic Observer Patient Proactive Organized
Systematics	To identify the main groups of crustaceans of commercial interest and their characteristics: Decapods.	To classify at the genus level the crustacean species of aquaculture importance.	Synthesis and analysis ability. Punctual Systematic Observer Patient Proactive Organized
Biology	To describe the morphophysiological characteristics of decapods. Explain the life cycle of the decapods.	To differentiate decapod with aquaculture importance, based on its morphophysiological structure.	Synthesis and analysis ability. Punctual Systematic Observer Patient Proactive Organized

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CULTURE OF CRUSTACEANS

EVALUATION PROCESS

Learning outcomes	Learning sequence	Instruments and type of reagents
<p>To collect, from a field practice, specimens and to present a catalog of decapod of aquaculture importance that should include:</p> <ul style="list-style-type: none"> -Taxonomic category to which it belongs. -Description of the morphophysiological characteristics with diagrams and photographs. -Aquaculture importance of the species collected: ecological, economic and social. 	<ol style="list-style-type: none"> 1. To understand the historical background of crustaceans. 2. To identify crustacean species of commercial interest and their morphophysiological characteristics. 3. To understand the life cycle of decapod with aquaculture importance. 4. To understand the ecological, economic and social importance of decapod cultivation. 	<p>Practical exercise Checklist</p>

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CULTURE OF CRUSTACEANS

TEACHING LEARNING PROCESS

Teaching methods and techniques	Media and didactic materials
Research tasks Directed discussion Field trips with in situ practice	Projector Computer Internet Whiteboard Material for collecting crustaceans Classification Guide

LEARNING SPACE

Classroom	Laboratory / Workshop	Company
X		

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LEARNING UNITS

1. Theme Units	II. Cultivation of Decapod
2. Theoretical Hours	30
3. Practical Hours	60
4. Total Hours	90
5. Objective of the Learning Unit	The student will cultivate decapod crustaceans of commercial interest at any stage of development, for their production and commercialization.

Themes	Learning to know	Learning to do	Learning to be
Conditioning of the breeders.	To explain the characteristics, parameters and procedures of selection and maturation techniques of decapod crustacean breeders.	To select decapod crustaceans according to their morphological and genetic characteristics. To condition decapod crustaceans towards reproduction.	Synthesis and Analysis ability Responsible Ethical Punctual Meticulous Precise Efficient Observer Patient Proactive Organized Cautious
Reproduction	To explain the characteristics, parameters and procedures of the techniques of induction to spawning and fertilization of bivalve decapod crustaceans.	To induce spawning and fecundation of decapod crustaceans.	Synthesis and Analysis ability Responsible Ethical Punctual Meticulous Precise Efficient Observer Patient Proactive Organized Cautious

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Themes	Learning to know	Learning to do	Learning to be
Larval Cultivation	To explain the characteristics, parameters and procedures of management techniques in cultivation of the stages of larval development of decapod: <ul style="list-style-type: none"> • Nauplius Culture technique • Protozoa Culture technique • Mysis Culture technique. • Post-larvae Culture technique • Transportation, acclimatization and sowing techniques 	To cultivate larvae and post-larvae of decapod crustaceans.	Synthesis and Analysis ability Responsible Ethical Punctual Meticulous Precise Efficient Observer Patient Proactive Organized Cautious
Fattening	To identify the characteristics, parameters and procedures of the methods and techniques of fattening decapod.	To perform the fattening of decapod crustaceans.	Synthesis and Analysis ability Systematic Responsible Self-disciplined Ethical Punctual Meticulous Precise Honest Efficient Observer Trustworthy Meticulous Patient Tolerant Proactive Assertive Leader Organized Cautious

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EVALUATION PROCESS

Learning outcomes	Learning sequence	Instruments and type of reagents
<p>From a series of decapod crustaceans cultivation practices, the student will integrate a technical report which should include:</p> <ul style="list-style-type: none"> - Description of the species and cultivation techniques applied in each one of the phases of the cultivation: <li style="padding-left: 20px;">- Conditioning <li style="padding-left: 20px;">- Reproduction <li style="padding-left: 20px;">- Larvae and post-larvae <li style="padding-left: 20px;">- Fattening - Logbook according to the Manual of Good Practices - Schemes and photographs - Discussion and conclusions, contrasting the results with parameters of the Manual of Good Practices. 	<ol style="list-style-type: none"> 1. To understand the techniques of selection and maturation of decapod crustaceans. 2. To understand the techniques of spawning and fertilization of decapod crustaceans. 3. To identify the techniques applicable in the larval stages of decapod crustaceans. 4. To understand the fattening techniques of decapod crustaceans. 	<p>Project Checklist</p>

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TEACHING LEARNING PROCESS

Methods and teaching techniques	Media and didactic materials
In situ Practice Research Tasks Collaborative Teams	Computer Canyon Projector Whiteboard Markers Lab equipment Internet Boat Binoculars Camera Boots Quadrant GPS Glassware for organism collection Field equipment

LEARNING SPACE


Classroom	Laboratory / Workshop	Company
	X	

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CULTURE OF CRUSTACEANS

CAPACITIES DERIVED FROM THE PROFESSIONAL COMPETENCES TO WHICH THE COURSE CONTRIBUTES


Capacity	Performance criteria
<p>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 goals of production.</p>	<p>To prepare a program of the productive cycle based on the manual of good practices for the respective specie or species which should contain:</p> <ul style="list-style-type: none"> • sowing 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
<p>To conditioning the aquaculture production system through cleaning, disinfection, filling and fertilization techniques and based on the productive program, to plant the organisms according to the requirements of the species.</p>	<p>To prepare a report of activities for the conditioning of the system, based on the production cycle schedule, the species and the aquaculture system, which should contain:</p> <ul style="list-style-type: none"> • Materials and methods for cleaning and disinfection. • Materials and methods used for the conditioning of the system.

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Capacity	Performance Criteria
<p>To supervise the reproduction process in aquaculture systems by means of the methodology corresponding to each species, considering good management practices, for obtaining larvae and post-larvae and offspring.</p>	<p>To write a reproduction logbook and reproduced species logbook according to the of good practices manual where the students reports the following data:</p> <ul style="list-style-type: none"> • Selection of breeders <ul style="list-style-type: none"> • Number of breeders (males and females) • Systems density breeders, 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)
<p>To direct the sowing process through the methodology corresponding to each species and considering good management practices, to start the production cycle and avoid economic losses.</p>	<p>To prepare a report on the transportation, arrival and sowing process based on the good practices manual, including:</p> <ul style="list-style-type: none"> • 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. • Sowing method.
<p>To verify the fattening process of aquaculture organisms through biometric, health, safety and nutrition techniques, based on good practices to contribute to the performance and quality of aquaculture production.</p>	<p>The student prepares logbooks of the fattening process of aquaculture organisms, based on good practices, which should include:</p> <ul style="list-style-type: none"> • 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.

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Capacities	Performance criteria
<p>To supervise the process of harvesting aquaculture products based on the established program, the methods and techniques corresponding to the species and good practices, to meet the requirements of the organization and the market.</p>	<p>To prepare a report on the process of harvesting aquaculture products, based on good practices, specifying:</p> <ul style="list-style-type: none"> • 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

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BIBLIOGRAPHY

Author	Year	Title	City	Country	Publisher
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E.S. Iversen	(1982)	<i>Cultivos marinos</i>	Zaragoza	España	Acribia S.A.
Barnabe, G.	(1996)	<i>Bases biológicas y ecológicas de la acuicultura</i>	Zaragoza	España	Acribia S.A.
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