HIGHER UNIVERSITY TECHNICIAN IN AQUACULTURE
PROJECTS SPECIALIST
PROFESSIONAL COMPETENCIES

COURSE: CULTURE OF AMPHIBIANS AND REPTILES

LEARNING UNITS

1. Competencies	Develop sustainable aquaculture projects, based on the market needs and the established regulations, to contribute to the development of the sector.
2. Four Month Period	FIFTH
3. Theoretical Hours	35
4. Practical Hours	55
5. Total Hours	90
6. Week Total Hours Four Month Period	6
7. Course Objective	The student will determine the conditions for the cultivation of amphibians and reptiles, through the employment of methods, techniques and good practices, to contribute to the development of the sector.

LEARNING UNITS	Hours		
	Theoretical	**Practical**	**Total**
I. Introduction to Amphibians and Reptiles Cultivation	10	5	15
II. Amphibians	10	20	30
III. Reptiles	15	30	45
Totals	**35**	**55**	**90**

CULTURE OF AMPHIBIANS AND REPTILES

LEARNING UNITS

1. Theme Unit	I. Introduction to Amphibians and Reptiles Cultivation
2. Theoretical Hours	10
3. Practical Hours	5
4. Total Hours	15
5. Objective of the Learning Unit	The student will identify the morphophysiological features of the amphibians and reptiles, for their aquaculture exploitation.

Themes	Learning to Know	Learning to Do	Learning to Be
Background and importance of amphibians and reptiles	Describe the historical aspects as well as the social, economic and ecological importance of the cultivation of amphibians and reptiles		Organized Methodical Honest Responsible Ethical
Systematics	Identify the main groups of amphibians and reptiles of aquaculture commercial interest and their characteristics.	Identify at species-level the amphibians and reptiles with commercial importance in Aquaculture	Organized Methodical Honest Responsible Ethical
Morphophysiology of amphibians and reptiles	Describe the characteristics of the internal and external anatomy, biological functions, and life cycle of amphibians and reptiles.		Organized Methodical Honest Responsible Ethical

CULTURE OF AMPHIBIANS AND REPTILES

EVALUATION PROCESS

Learning outcomes	Learning sequence	Instruments and type of reagents
Prepare a catalog of amphibians and reptiles of aquaculture importance including: - Taxonomic category - Description of the morphophysiological features - Photographs and diagrams	1. Identify the types of amphibians and reptiles, and their historical background of aquaculture exploitation. 2. Identify the morphophysiological features of the amphibians and reptiles of aquaculture interest.	Essay Checklist

CULTURE OF AMPHIBIANS AND REPTILES

TEACHING LEARNING PROCESS

Methods and techniques of teaching	Media and didactic materials
Research tasks Collaborative teams Directed practice	Projector Computer Internet Whiteboard Dissection equipment Classification Guide

LEARNING SPACE

Classroom	Laboratory / Workshop	Company
	X	

CULTURE OF AMPHIBIANS AND REPTILES

LEARNING UNITS

1. Theme Units	**II. Amphibians**
2. Theoretical Hours	10
3. Practical Hours	20
4. Total Hours	30
5. Objective of the Learning Unit	The student will cultivate amphibians of aquaculture interest in their phases and stages, for their production and commercialization.

Themes	Learning to know	Learning to do	Learning to be
Conditioning or breeders	Explain selection techniques and maturation process of breeding amphibians.	Select breeding amphibians according to their morphological features.	Organized Methodical Honest Responsible Ethical
Reproduction	Explain the techniques of induction to spawning and fecundation of amphibians.	Induce spawning and fecundation of amphibians.	Organized Methodical Honest Responsible Ethical
Incubation and Larval cultivation	Explain the techniques of incubation and larval fecundation of amphibians in its different stages.	Handling of eggs and larval fecundation of amphibians.	Organized Methodical Honest Responsible Ethical
Pre-fattening	Describe current methods, and traditional techniques, employed in pre-fattening amphibians.	Develop pre-fattening of amphibians.	Organized Methodical Honest Responsible Ethical
Fattening	Describe current methods, and traditional techniques, employed in fattening amphibians.	Develop fattening of amphibians	Organized Methodical Honest Responsible Ethical

CULTURE OF AMPHIBIANS AND REPTILES

EVALUATION PROCESS

Learning outcomes	Learning sequence	Instruments and type of reagents
From a case study of cultivation of amphibian, the student will integrate a technical report including: - Morphological features - Taxonomy - Cultivation technique - Reproduction - Egg - Larva - Pre-fattening - Fattening - Log according to the Manual of Good Practices - Diagrams and photographs	1. Understand the processes of selection and maturation of amphibians. 2. Understand the procedures of spawning and fecundation of amphibians. 3. Understand the procedures of handling eggs and larval stages of amphibians. 4. Understand the amphibians pre-fattening process. 5. Understand the amphibians fattening procedures.	Practical exercises Checklist

CULTURE OF AMPHIBIANS AND REPTILES

TEACHING LEARNING PROCESS

Methods and teaching techniques	Media and didactic materials
In situ practice Practical exercises Collaborative teams	Projector Computer Internet Whiteboard Fresh and salt water quality kits Refractometer, Secchi disk, Oximeter Stereoscope Potentiometer Lab equipment Boats Buckets Field equipment Lab glassware Transportation equipment Maintenance

LEARNING SPACE

Classroom	Laboratory / Workshop	Company
	X	

CULTURE OF AMPHIBIANS AND REPTILES

LEARNING UNITS

1. Learning Units	**III. Reptiles**
2. Theoretical Hours	15
3. Practical Hours	30
4. Total Hours	45
5. Objective of the Learning Unit of	The student will cultivate reptiles of aquaculture interest in their phases and stages, for their production and commercialization.

Themes	Learning to Know	Learning to Do	Learning to Be
Conditioning or breeders	Explain selection techniques and maturation process of breeding reptiles	Select breeding reptiles according to their morphological features.	Organized Methodical Honest Ethical Responsible
Reproduction	Explain the techniques of induction to spawning and fecundation of reptiles.	Induce spawning and fecundation of reptiles.	Organized Methodical Honest Ethical Responsible
Incubation	Explain the techniques of handling eggs in the incubation and hatching of reptiles.	Handling of eggs and hatching of reptiles' eggs.	Organized Methodical Honest Ethical Responsible
Pre-fattening	Describe current methods, and traditional techniques, employed in fattening reptiles.	Perform pre-fattening of reptiles.	

CULTURE OF AMPHIBIANS AND REPTILES

EVALUATION PROCESS

Learning outcomes	Learning sequence	Instruments and type of reagents
From a case study of cultivation of amphibians, the student will integrate a technical report including: - Morphological features - Taxonomy - Cultivation technique - Reproduction - Egg - Pre-fattening - Fattening - Diagrams and photographs	1. Understand the processes of selection and maturation of reptiles. 2. Understand the procedures of spawning and fecundation of reptiles. 3. Understand the procedures for handling reptiles' eggs. 4. Understand the reptiles' pre-fattening process. 5. Understand the reptiles' fattening procedures.	Practical exercises Checklist

CULTURE OF AMPHIBIANS AND REPTILES

TEACHING LEARNING PROCESS

Methods and teaching techniques	Media and didactic materials
In situ practice Practical exercises Collaborative teams	Projector Computer Internet Whiteboard Fresh and salt water quality kits Refractometer, Secchi disk, Oximeter Stereoscope Potentiometer Lab equipment Boats Buckets Field equipment Lab glassware Transportation equipment Maintenance

LEARNING SPACE

Classroom	Laboratory / Workshop	Company
	X	

CULTURE OF AMPHIBIANS AND REPTILES

CAPACITIES DERIVED FROM THE PROFESSIONAL COMPETENCES TO WHICH THE COURSE CONTRIBUTES

Capacity	Performance criteria
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.	Prepare a program of the productive cycle based on the manual of good practices for the respective specie or species which should contain: • 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
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.	Write a reproduction logbook and reproduced species logbook according to the of good practices manual where the students reports the following data: Selection of breeders • 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)
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.	Prepare a report on the transportation, arrival and sowing process based on the good practices manual, including: • Transportation: conditions of reception of organisms, number of organisms, size, weight, temperature, oxygen, legal documentation, preventive treatments, method and time of transport.

Capacity	Performance criteria
	- Arrival at the farm: tempering methodology, number of organisms, weight, sizes, planting densities, preventive treatments. Sowing method.
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.	Prepare logbooks about the fattening process of aquaculture organisms, based on good practices, which should include: • 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.
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.	Prepare a report on the process of harvesting aquaculture products, based on 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
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.	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.

Capacity	Performance criteria
	-Environmental forecasts and, where appropriate, evaluation of alternatives. - Identification of the methodological instruments and technical elements that support the indicated information.

BIBLIOGRAPHY

Author	Year	Tittle	City	Country	Publisher
Casas, G. y McKoy, C.	1987	*Anfibios y reptiles de Mexico: Claves ilustradas para su identificacion*	México, D. F.	México	LIMUSA
Ackerman, L.	1997	*The Biology, Husbandry and Health Care of Reptiles*	Nueva York	E.U.A	TFH Publications
Nash, C. E.	1991	*Production of Aquatic Animals: Crustaceans, Molluscs, Amphibians and Reptiles*	Amsterdam	Holanda	Elsevier
Bartlett R. y Bartlett, P.	2001	*Box Turtles: Facts & Advice on Care and Breeding (Reptile Keeper's Guide)*	Chicago	E.U.A	Barron's Educational Series
Highfield, A. C.	1996	*Practical Encyclopedia of Keeping and Breeding Tortoises and Freshwater Turtles*	Chicago	E.U.A	Krieger Publishing Company
Casas, G. y McKoy, C.	1987	*Anfibios y reptiles de Mexico: Claves ilustradas para su identificacion*	México, D. F.	México	LIMUSA