

**NONG LAM UNIVERSITY-HCMC
FACULTY OF FISHERIES
SFSS CENTER**

**SSNS Training Course 1:
Aquatic animal (shrimp and fish) diseases diagnosis**

Background

In the Mekong Delta of Vietnam, freshwater fish (mainly catfish) and marine shrimp (mainly black tiger shrimp and white-leg shrimp) are the major commercial species. Catfish and shrimp culture are of the leading aquaculture industries which significantly contribute to the country economy. However, their explosive development with intensified density of culture practices have been troubled by many obstacles and challenges including problems on diseases and seed quality, environmental sustainability, export-import trading barriers, and other global and regional socioeconomic problems of which disease issue was one of the most concerned problems. Recently, many aquaculture companies need more well-trained technicians for their fish and shrimp disease control. This course is designed to train technicians for the hand-on techniques in disease diagnosis and treatment of major aquatic species. The aims of this course are to provide an understanding of current agents that cause diseases in shrimp in aquaculture, promotes correct diagnoses and recommend some appropriate control measure.

Learning outcome

Upon completion of this course, learners should be able to:

1. collect samples (in the field) and test for aquaculture environmental parameters
2. count the bacteria (total bacteria, *Vibrio*) in aquaculture environment and in the intestine of shrimp, catfish
3. use microscopy to check for normal and abnormal hepatopancreas and intestine cells of shrimp

Lectures – Five days (2 hours every day) – Classroom and field

Day 1: Lecture on shrimp sample collection (in field):

Day 2: Lecture on Shrimp bacteriological assessment

Day 3: Lecture on sample collection (in field):

Day 4: Lecture on catfish bacteriological assessment

Day 5: Lecture on preservation techniques

Practical – Five days (6 hours every day) – Shrimp and catfish farms

Day 1: In shrimp farm

- Shrimp sample (healthy and diseased) collection:
- Hepatopancreas analysis (in field)
- Intestine content analysis (in field)
- *Vibrio* count in shrimp sample
- *Vibrio* count in pond (water + mud)
- Shrimp health assessment (in field)
- environmental parameter testing (pond water)

Assessment

Day 2: In laboratory

- Microbiological laboratory preparation

- Hepatopancreas assessment (microscopy)
- Intestine content assessment (microscopy)
- Vibrio count in shrimp sample (plate count)
- Vibrio count in pond (water + mud) (plate count)
- Recommend some appropriate control measures

Assessment

Day 3: In catfish farm

- Catfish sample (healthy and diseased) collection:
- Parasite analysis of catfish
- Intestine content analysis (in field)
- Total bacteria count in catfish sample
- Total bacteria count in pond (water + mud)
- Catfish health assessment (in field)
- Environmental parameter testing (pond water)

Assessment

Day 4: In laboratory

- Microbiological laboratory preparation
- Intestine content assessment (microscopy)
- Total bacteria count in catfish sample (plate count)
- Total bacteria count in pond (water + mud) (plate count)
- Recommend some appropriate control measures

Assessment

Day 5: In laboratory

- Cold and freezing preservation: Shrimp sample, catfish samples, pond water sample, mud sample, isolated bacteria preservation in laboratory for long and cold or freezing storage.

Assessment

Final report: each trainee is required to prepare a report on what they practice at the farm and laboratory – The length of the report may vary accordingly but should not be over 10 pages.

Presentation of results by the group of trainees (Seminar Room)

- At the end of practical session, group presentation will be organized, in which they will discuss what lesson they may technically learn from the training.
- Wrap-up by Instructor (1 hour)

Feedback and evaluation by participants

Resource persons: Nguyen Huu Thinh, Truyen Nha Dinh Hue, Nguyen Hoang Nam Kha

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SSNS Training Course 2:
Techniques for seed production of freshwater fish

Background

In the Mekong Delta of Vietnam, farming of freshwater fish is one of the leading aquaculture industries which significantly contribute to the country economy. Thus seed production has to support the farming with sufficient numbers of seed required for the grow-out farming. Recently, many aquaculture companies need more well-trained technicians for their seed production. This course is designed to train technicians for the hand-on techniques in seed production of some freshwater fish species. The aims of this course are to provide learners with basic knowledge in seed production of freshwater fish, including brood-stock selection and rearing, induced spawning techniques, fertilizing techniques, incubating techniques, rearing techniques from fry to fingerling stage, and seed transportation. The course is also to equip learners on how to evaluate and improve seed quality.

Learning outcome

- Learners will be improved in their knowledge in seed production
- They are able to conduct seed production at their farms, from brood-stock selection to fingerling rearing stages, and seed transportation
- They are also able to evaluate and improve seed quality

Lectures – Three days (7 hours every day) – Classroom

1. Basic knowledge on seed production of freshwater fish
2. Brood-stock rearing: principles and practices
3. Induced spawning: hormone injection and non-hormone methods
4. Artificial fertilization: principles and practices
5. Rearing fry to fingerling: principles and practices
6. Seed transportation techniques
7. Seed quality: current and measures for improvement

Practical – Three days (8 hours every day) – Hatchery

- Practice on artificial breeding of 2 catfish species:
 - 1- Redtail catfish (*Hemibagrus wyckiioides*): selection of breeders, hormone injection, spawning, fertilization, incubation, hatching
 - 2- Catfish (*Hemibagrus nemurus*): selection of breeders, hormone injection, spawning, fertilization, incubation, hatching

Final report including business plan: each trainee is required to prepare a report on what they practise at the hatchery – The length of the report may vary according ly but should not be over 10 pages.

Presentation of results by the group of trainees (Seminar Room)

- At the end of practical session, group presentation will be organized, in which they will discuss what lesson they may technically learn from the training.
- Wrap-up by Instructor (1 hour)

Feedback and evaluation by participants

Resource persons: Ngo Van Ngoc, Tran Van Minh and Vo Thanh Liem

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**SSNS Training Course 3:
 Water quality analysis for aquaculture**

Background

The efficient and profitable production of aquatic animals such as fish, crustacean, etc. in aquaculture depends on a suitable environment in which they can reproduce and grow. Those animals live and are totally dependent on the water they live in for all their needs, the major environmental concern within the culture system is water quality. Water quality is the most important factor affecting fish health and performance in aquaculture production systems for many years. Different aquatic organisms have different and specific range of water quality parameters within which they can survive, grow and reproduce. The result is deteriorating water quality which stresses the culture species, and stress leads to poor growth, greater incidence of disease, increased mortality, and low production. Water quality parameters that are commonly monitored and managed in the aquaculture industry include temperature, pH, dissolved oxygen, salinity, alkalinity, ammonia, nitrites and hardness. The purpose of this training course is to provide a practical guide to the monitoring and management of aquaculture pond water.

Learning outcome

- Clearly understand water quality parameters and their key properties
- Develops skill in the monitoring and management of water quality in ponds and interpretation of water quality data

Lectures & Practical – 4 days (24 hours) – Lecture Room, Laboratory and Pond

Day	Time	Content	Method	Place	Materials	Moderator
Day 1	Morning <i>3 hours</i>	Water resources and quality criteria for aquaculture	Lecture	Lecture Room	LCD projector, computer	Tu
	Afternoon <i>1,5 hours</i>	Sampling and preservation principles and techniques	Lecture	Lecture Room	LCD projector, computer	Tu
	<i>1,5 hours</i>	Sampling and preservation	Practical	Pond	Water sampler, ice box	Tu & Thuy
Day 2	Morning <i>3 hours</i>	Data Gathering and Evaluation <i>Introduction to statistical methods</i> <i>Quality Control of Chemical Analyses</i>	Lecture	Lecture Room	LCD projector, computer	Tu

	Afternoon	Temperature / pH / Oxygen / Salinity	Practical	Lab	pH meter, DO meter, refractometer	Tu
	<i>1,0 hours</i>	<i>Sensor adjustment, calibration and cleaning</i>				
	<i>2,0 hours</i>	<i>Measuring Temperature / pH / Oxygen / Salinity</i>	Practical	Pond		Thuy
Day 3	Morning <i>3,0 hours</i>	Hardness and Alkalinity	Practical	Lab	Chemicals	Thuy
	Afternoon <i>3,0 hours</i>	Ammonia & Nitrite	Practical	Lab	Chemicals, Spectrometer	Thuy
Day 4	Morning <i>3,0 hours</i>	Nitrate & Phosphate	Practical	Lab	Chemicals, Spectrometer	Thuy
	Afternoon <i>3,0 hours</i>	Water quality assessment and management for aquaculture pond	Lecture	Leacture Room	LCD projector, computer	Tu

Final report including business plan: each participant is required to prepare a report on what they practice at pond and in laboratory – The length of the report may vary accordingly but should be less than 5 pages.

Presentation of results by the group of students (Lecture Room)

- Techniques and lessons learned
- Wrap-up by Instructor (1 hour)

Feedback and evaluation by students / participants

Resource persons: Dr Nguyen P C Tu & Mrs. Tran H Thuy

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**SSNS Training Course 4:
Aquatic Animal Nutrition**

Background

Aquaculture plays an important role in supplying nutritious food for the whole world. As the demand has been increasing, there is a trend of expanding high-intensification farming systems such as intensive and super-intensive models. In these models, aquatic animals are almost relied on nutrients from the pellet feed and feed cost comprises the main proportion of production cost. In order for aquaculture industry develops in a sustainable way, an optimization of feed cost and feeding management is crucial. This training course provides updated information and knowledge on the utilization of feed ingredients and additives as well as feed formulation, production and feeding management to fulfill an important objective of aquaculture industry: a sustainable development.



Learning outcome

- Enhance and update knowledge about aquatic animal nutrition and feeding management, focusing on commercially important species.
- Apply these knowledge and information into feed formulation and feeding management to ensure a long-term sustainable development of aquaculture industry.

Lectures – 12 hours – Classroom

8. Feeding, digestion and metabolism of aquatic animals.
9. Functions and utilization's trends of basic nutrients in aquafeed: protein, lipid, vitamin, mineral and feed additives.
10. Updated information on feed formulation, production and feeding management.

Field trip – 16 hours (2 days)

- Visit 2 feed mills producing feed for aquatic animals to understand about aquafeed manufacture.
- Visit 2-3 aquaculture farms to understand about farm operation, feed and feeding management.

Field trip report: by each participant

Feedback and evaluation by students / participants

Resource persons: Dr Nguyen Nhu Tri – Nong Lam University

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**SSNS Training Course 5:
Environmental Risk Assessment**

Background

In Vietnam, aquaculture has surpassed capture fisheries and has contributed significantly to the national economy. However, it has a number of biosecurity concerns that pose risks and hazards to both its development and management, and to the aquatic environment and society. This course will introduce students to the basic framework, concepts, and methods of environmental risk assessment with an emphasis on ecological effects on aquatic ecosystems. This course promotes an operational understanding of hazard, vulnerability and risk assessment methodologies for natural disasters and man-made events.

Learning outcome

The students will be expected to apply the environmental risk assessments framework by completing an environmental risk assessment project.

Students are expected to:

- Be able to apply commonly used hazard, vulnerability and risk assessment methodologies.
- Critically review existing hazard and risk based standards/guidelines and the rationale supporting the guidelines.
- Formulate remedial hazard and risk management plans

Content: The content of this course is highlighted in the table below.

Time duration (minute)	Content	Tasks, questions, working steps	Method	Materials (technical)	Moderator
30	<i>Introduction to Basic Concepts: Hazard and Risk</i>	Risk fundamentals Vulnerability assessment methodologies	Lecture; discussion	LCD projector, computer, flipchart stands and pads	Luong and assistant
30	<i>Risk management and decision analysis</i>	Basic definitions of risk, hazard and vulnerability	Lecture; discussion	LCD projector, computer, flipchart stands and pads	Luong and assistant
30	<i>Risk and decision analysis application</i>	Decision tree analysis	Lecture; discussion	LCD projector, computer, flipchart stands and pads	Luong and assistant

30	<i>HAZUS: Dealing with Natural Disasters</i>	Multi-hazard analysis Applications to earthquake, flood and hurricane scenarios	Lecture; discussion	LCD projector, computer, flipchart stands and pads	Luong and assistant
30	<i>Threat Assessment Methodology for Man-made Hazards</i>	Threat and risk assessment Applications to attack scenarios	Lecture; discussion	LCD projector, computer, flipchart stands and pads	Luong and assistant
30	<i>Asset Value Assessment</i>	Value analysis Applications to attack scenarios	Lecture; discussion	LCD projector, computer, flipchart stands and pads	Luong and assistant
30	<i>Accidental Events and Emergency Responses</i>	Introduction to emergency response Incident control	Lecture; discussion	LCD projector, computer, flipchart stands and pads	Luong and assistant
30	<i>Environmental Risk Management</i>	Application of basic risk management principles Risk analysis using software	Lecture; discussion	LCD projector, computer, flipchart stands and pads	Luong and assistant

Field trip: visit shrimp or fish farm in the Mekong Delta, Vietnam

Final report including business plan: each trainee is required to develop a project on what they observed in the fieldtrip using the knowledge equipped in the lecture note – The length of the report may vary accordingly but should not be over 15 pages.

Presentation of results by the group of trainees (Seminar Room)

- At the end of practical session, group presentation will be organized, in which they will discuss what lesson they may technically learn from the training.
- Wrap-up by Instructor (1 hour)

Feedback and evaluation by participants

Resource persons: Vu Cam Luong

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**SSNS Training Course 6:
Introduction to Quality Management System for Seafood Safety
(student training: trial)**

Background

The fishery sector in recent years have been developing towards sustainability, ensuring exported seafood products can be easy for traceability and well-controlled quality in the whole chain production from seeds to finished products. Quality control and food safety assurance have always been one of the most important task for Vietnam seafood, especially in processing and exporting. This course will introduce students to the basic framework, concepts of quality management systems with an emphasis on seafood safety assurance.

Learning outcome

The students will be expected to understand the quality management systems currently applied in seafood processing factories.

Students are expected to:

- Be able to analyse hazards and risk assessment for seafood processing factories.
- Be able to understand the purpose and content of the ISO 22000 Food Safety Management Standard, HACCP system, BRC global standards for food safety.

Content: The content of this course is highlighted in the table below.

Time duration (minute)	Content	Tasks, questions, working steps	Method	Materials (technical)	Moderator
30	<i>Introduction to Basic Concepts: Hazard and Risk</i>	Hazard and Risk fundamentals	Lecture; discussion	LCD projector, computer, flipchart stands and pads	External expert (Dang Hoang Du)
30	<i>Risk management and decision analysis</i>	Basic definitions of risk assessment	Lecture; discussion	LCD projector, computer, flipchart stands and pads	External expert (Dang Hoang Du)
60	<i>ISO 22000 Food Safety Management Standard</i>	Decision tree analysis	Lecture; discussion	LCD projector, computer, flipchart stands and pads	External expert (Dang Hoang Du)

60	<i>HACCP system</i>	Multi-hazard analysis	Lecture; discussion	LCD projector, computer, flipchart stands and pads	External expert (Dang Hoang Du)
60	<i>BRC global standards for food safety</i>	Decision tree analysis	Lecture; discussion	LCD projector, computer, flipchart stands and pads	External expert (Dang Hoang Du)

Field trip: visit catfish processing plant in the Mekong Delta, Vietnam (limitation due to COVID 19)

Final report: each trainee is required to develop a quality control procedure for a interested seafood product on what they observed in the fieldtrip using the knowledge equipped in the lecture note (for students no fieldtrip and report due to time limitation and COVID pandemic)

Presentation of results by the group of trainees (Seminar Room)

- At the end of practical session, group presentation will be organized, in which they will discuss what lesson they may technically learn from the training.
- Wrap-up by Instructor (1 hour)

(for students no fieldtrip, presentation and report due to time limitation and COVID pandemic)

Feedback and evaluation by participants

Resource persons: External expert (Dang Hoang Du)