

**COURSE OUTLINE DETAILS**

**1. Course: Shellfish hatchery management (Quản lý trại giống giáp xác và nhuyễn thể)**

- **Code number:** AQ223

- **Credits:** 3

- **Hours:** 30 theory hours, 30 practice hours, and 60 self-study hours

**2. Management Unit:**

- **Department:** Coastal Aquaculture

- **Faculty:** College of Aquaculture and Fisheries

**3. Requisites:**

- **Prerequisites:** No

- **Corequisites:** No

**4. Course objectives:**

Objectives	Descriptions	Program Outcomes
4.1	To provide students with knowledge of the current status, challenges, potential and strategies for sustainable development of shellfish aquaculture in the world and in Vietnam; the reproductive biological characteristics of different cultured species of shellfish; technologies of seed production and hatchery management of shellfish species	2.1.3a; b
4.2	To train students on how to prepare a project proposal on seed production and apply technologies to practical conditions of hatchery management of important shellfish, such as shrimp, prawn, crabs, oysters, clams in Vietnam and the Mekong Delta.	2.2.1.a,b
4.3	To improve skills in group work, information searching and report presentation.	2.2.2
4.4	To promote student's responsibilities in contribution to the development of aquaculture in the region, scientific and practical attitude, self and long-life learning, and autonomy in their career.	2.3

**5. Course learning outcomes:**

COs	Descriptions	Objectives	POs
	<b>Knowledge</b>		
CO1	Generalize the status, trends and sustainable development of shellfish culture in the world and Vietnam	4.1	2.1.3.a, b
CO2	Describe reproductive biology and seed production technology and hatchery management of shellfish, especially important species such as marine shrimp, freshwater prawn, mud crab, clam, oyster, blood cockle...	4.1	2.1.3.a,b
	<b>Skills</b>		
CO3	Practice on seed production of important shellfish species, such as marine shrimp, freshwater prawn, mud crab, clam, oyster, blood cockle...	4.2	2.2.1.a,b
CO4	Develop a project proposal for shellfish seed production; how to work and present report in group effectively	4.3	2.2.2
	<b>Attitudes/Autonomy/Responsibilities</b>		
CO5	Graduated students have good attitudes in their careers, good capability and autonomy in planning and solving issues in aquaculture, and high responsibility in contribution to development of aquaculture in the region.	4.4	2.3

Note: "COs" means Course Outcomes; "POs" means Program Outcomes

**6. Brief description of the course:**

This course is one of the specialized courses in aquaculture academic program. The course introduces students to the general information about the current status, roles and issues for sustainable development of shellfish aquaculture; introduces reproductive biological characteristics of shellfish species, and introduces seed production technologies of important shellfish species. In addition, the course includes fieldtrips to visit different hatcheries in the regions. The course approaches different methods to enhance learning capability of students.

**7. Course structure:****7.1. Theory:**

	Content	Hours	COs
<b>Chapter 1.</b>	<b>General introduction</b>	<b>3</b>	<b>CO1</b>
1.1.	Development and roles of crustacean seed production and culture in the world and in Vietnam		



1.2.	Development and roles of mollusk seed production and culture in the world and in Vietnam		
1.3.	Issues and strategies for sustainable development of crustacean and mollusk seed production and culture		
<b>Chapter 2.</b>	<b>Reproductive Biology and seed production of marine shrimps</b>	<b>9</b>	CO2, CO3, CO4, CO5
2.1	Introduction about shrimp seed production		
2.2	Reproductive biology of marine shrimps		
2.3	Seed production technology of marine shrimp <ul style="list-style-type: none"> <li>- Hatcheries site selection</li> <li>- Hatcheries facilities</li> <li>- Water sources and treatment</li> <li>- Broodstock culture and spawning</li> <li>- Larval culture systems and methods</li> <li>- Postlarval nursing</li> <li>- Life food culture and use</li> <li>- Health and quality management</li> <li>- Biosecurity issues</li> </ul>		
<b>Chapter 3.</b>	<b>Reproductive biology and seed production of giant freshwater prawn</b>	<b>3</b>	CO2, CO3, CO4, CO5
3.1	Introduction		
3.2	Reproductive biology of giant freshwater prawn		
3.3	Seed production technology of freshwater prawn <ul style="list-style-type: none"> <li>- Hatcheries site selection</li> <li>- Hatcheries facilities</li> <li>- Water sources and treatment</li> <li>- Broodstock culture and spawning</li> <li>- Larval culture systems and methods</li> <li>- Postlarval nursing</li> <li>- Health and quality management</li> <li>- Biosecurity issues</li> </ul>		
<b>Chapter 4.</b>	<b>Reproductive Biology and seed production of mud crabs</b>	<b>3</b>	CO2, CO3, CO4, CO5
4.1	Introduction		
4.2	Reproductive biology of mud crabs		
4.3	Seed production technology of marine shrimp <ul style="list-style-type: none"> <li>- Hatcheries site selection</li> <li>- Hatcheries facilities</li> </ul>		

	<ul style="list-style-type: none"> <li>- Water sources and treatment</li> <li>- Broodstock culture and spawning</li> <li>- Larval culture systems and methods</li> <li>- Crablet nursery</li> <li>- Health and quality management</li> <li>- Biosecurity issues</li> </ul>		
<b>Chapter 5.</b>	<b>Reproductive biology and seed production of Clam</b>	<b>3</b>	CO2, CO3, CO4, CO5
5.1	Introduction		
5.2	Reproductive biology		
5.3	Seed production technology of clam <ul style="list-style-type: none"> <li>- Hatcheries site selection</li> <li>- Hatcheries facilities</li> <li>- Water sources and treatment</li> <li>- Broodstock culture and spawning</li> <li>- Larval culture systems and methods</li> <li>- Health and quality management</li> <li>- Other issues: collection and use of natural seeds</li> </ul>		
<b>Chapter 6.</b>	<b>Reproductive Biology and culture of Cockle</b>	<b>3</b>	CO2, CO3, CO4, CO5
6.1	Introduction		
6.2	Reproductive biology		
6.3	Seed production technology of cockle <ul style="list-style-type: none"> <li>- Hatcheries site selection</li> <li>- Hatcheries facilities</li> <li>- Water sources and treatment</li> <li>- Broodstock culture and spawning</li> <li>- Larval culture systems and methods</li> <li>- Health and quality management</li> <li>- Other issues: collection and use of natural seeds</li> </ul>		
<b>Chapter 7.</b>	<b>Reproductive biology and seed production of Oyster</b>	<b>3</b>	CO2, CO3, CO4, CO5
7.1	Introduction		
7.2	Biology		
7.3	Seed production technology of cockle <ul style="list-style-type: none"> <li>- Hatcheries site selection</li> <li>- Hatcheries facilities</li> <li>- Water sources and treatment</li> <li>- Broodstock culture and spawning</li> </ul>		

	<ul style="list-style-type: none"> <li>- Larval culture systems and methods</li> <li>- Health and quality management</li> </ul> Other issues: collection and use of natural seeds		
<b>Chapter 8</b>	<b>Seed production of other mollusks</b>	<b>3</b>	CO2, CO3, CO4, CO5
8.1	Biology of important species		
8.2	Seed production technology		

## 7.2. Practice – Fieldtrips

	<b>Content</b>	<b>Hours</b>	<b>COs</b>
<b>Unit 1</b>	Practice on larval culture of shrimps, prawn, crabs and hatchery visit	30	CO2, CO3, CO4, CO5

## 8. Teaching methods

Teaching methods include lecturing with PowerPoint, discussion and testing students in class and online classroom; giving assignments; introducing and checking further reading or self study of students. At hatcheries, guiding students to do practices daily on seed production of shrimp, prawn, crabs; guiding students on observation of larvae, data collection and evaluation. For field trips, guiding students to observe and interview and discuss with hatchery technicians and managers and record information. Students will be evaluated through results of different activities.

## 9. Duties of student

Students have to do the following duties:

- Attend at least 80% theory lectures
- Conduct all of group or individual reports
- Attend midterm and final exam
- Actively carry out self study activities
- Attend the fieldtrips to farm sites.

## 10. Assessment of course learning outcomes

### 10.1. Assessment

<b>No.</b>	<b>Point components</b>	<b>Rules and Requirements</b>	<b>Weights</b>	<b>COs</b>
1	Hatchery practice	Attend and complete the group works on hatchery practice, report preparation and presentation	20%	CO1, CO2, CO3, CO4, CO5
2	Mid-term tests	Short tests with multiple choice or writing	10%	CO1, CO2, CO3, CO4, CO5



3	Final exam	<ul style="list-style-type: none"> <li>- Writing + multiple choice (60 minutes)</li> <li>- Attend at least 80% theory lectures</li> <li>- Obligation</li> </ul>	60%	CO1, CO2, CO3, CO4, CO5
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## 10.2. Grading

- Grading components and final test scores will be marked on a scale of 10 (0 to 10), rounded to one decimal place.
- Course score is the sum of all the components of the evaluation multiplied by the corresponding weight. The course score is marked on a scale of 10 and rounded to one decimal place, then it is converted to A-B-C-D score and score on a scale of 4 under the academic regulations of the University.

## 11. Learning materials:

Learning materials information	Barcode number
[1] Arlo W Fast and L James Lester. Marine Shrimp Culture: Principles and Practices (1992). ELSERVIER. 862 pages	
[2] DPI&F (2006) Australian Prawn Farming Manual, ACIAR, 2006. 159 pages ( <a href="http://aciarc.gov.au/publication/cop001">http://aciarc.gov.au/publication/cop001</a> )	
[3] FAO (2002) Farming freshwater prawns: A manual for the culture of the giant river prawn ( <i>Macrobrachium rosenbergii</i> ), 2002. 219 pages	
[4] FAO (2014) The State of World Fisheries and Aquaculture 2018. E-ISBN 978-92-5-108276-8 (PDF), 243 pages	
[5] Nguyễn Thanh Phương, Trần Ngọc Hải, Trần Thị Thanh hiền, Marcy Wilder, 2003. Nguyên lý và kỹ thuật sản xuất giống tôm càng xanh (Principles and technology for seed production of giant freshwater prawn). NXB NN, 138 trang	TS.004674
[6] Shelley, C.; Lovatelli, A., (2011) Mud crab aquaculture. No. 567. Rome, FAO. 2011. 78p. ( <a href="http://www.fao.org/docrep/015/ba0110e/ba0110e00.htm">http://www.fao.org/docrep/015/ba0110e/ba0110e00.htm</a> )	
[7] Spencer B.E. (2002) Molluscan Shellfish Farming. Blackwell Publishing, ISBN 0 85238 291-X: 274 pages.	639.96/S74 5; TS000789
[8] Teaching material/hand-out	
[9] Trần Ngọc Hải, Châu Tài Tảo, Nguyễn Thanh Phương, 2017. Giáo trình Kỹ thuật sản xuất giống và nuôi giáp xác (Text book – Seed production and farming technology for crustacean). NXB ĐHCT, 211 trang	TS.005489
[10] Trần Ngọc Hải, Nguyễn Thanh Phương, 2009. Nguyên lý và kỹ thuật nuôi tôm sú (Principles and culture technology of tiger shrimp). NXB NN, 203 trang	TS004143

[11] Trần Ngọc Hải, 2017. Nguyên lý và kỹ thuật nuôi cua biển (Principles and culture technology of mud crabs). NXB NN, 138 trang	TS005517
[12] Ngô Thị Thu Thảo và Trương Quốc Phú, 2012. Giáo trình Kỹ thuật nuôi động vật thân mềm. NXB ĐHCT, 132 Trang	639.4/Th10 8; MOL. 068897

## 12. Self-study Guide:

Week	Content	Theory (hours)	Practice (hours)	Student's Tasks
1	Chapter 1: General introduction	3	0	Reading: Book [4], [8] Chapter 1 of [5], [9], [10], [11], [12]
2-7	Chapter 2: Biology and culture of marine shrimps	18	0	Pre-reading: Book [1], [2], [8], [9], [10]
8-9	Chapter 3: Biology and culture of giant freshwater prawn	6	0	Pre-reading: Book [3], [5], [8], [9]
10	Chapter 4: Biology and culture of mud crab	3	0	Pre-reading: Book [6], [8], [9], [11]
11	Chapter 5: Biology and culture of Clam	3	0	Pre-reading: Book [7], [8], [12]
12	Chapter 6: Biology and culture of Blood Cockle	3	0	Pre-reading: Book [7], [8], [12]
13	Chapter 7: Biology and culture of Oyster	3	0	Pre-reading: Book [7], [8], [12]
14-15	Culture of other mollusks	6	0	Pre-reading: Book [7], [8], [12]

ON BEHALF OF RECTOR  
DEAN OF COLLEGE



Vũ Ngọc Út

Can Tho, 30/08/2022  
HEAD OF DEPARTMENT

Lê Quốc Việt