



COs	Descriptions	Objectives	POs
	<b>Knowledge</b>		
CO3	Describe taxonomic methods of fish, shrimp and other crustaceans.	4.1	2.1.2a
	<b>Skills</b>		
CO4	Practice in the external and internal morphology of fish and shrimp; Interpret the relationship between forms and functions; and evaluate configurations of biological systems of fish, shrimp and other crustaceans.	4.2	2.2.1a
CO5	Calculate fish biological indices and interpret the results.	4.2 4.3	2.2.1a 2.2.2
CO6	Practice in preservation, storing, and identification of fish, shrimp and other crustaceans.	4.2 4.3	2.2.1a 2.2.2
	<b>Attitudes/Autonomy/Responsibilities</b>		
CO7	Awareness of biodiversity conservation and sustainable utilization of fisheries resources	4.4	2.3

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

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

The course will provide students knowledge of the external and internal morphology, biological systems, and identification of fish, shrimp and other crustaceans. Basic knowledge of biodiversity conservation and fisheries management are also provided as well. Practical guidance on sample preservation and storing, morphometric examination, and identification will also be given.

#### 7. Course structure:

##### 7.1. Theory

	Content	Hours	COs
<b>Chapter 1.</b>	<b>Introduction</b>	<b>3</b>	
1.1.	Diversity of modern fishes		CO1;CO2; CO7
1.2.	History of ichthyology		CO1;CO2; CO7
1.3.	Fish classification		CO1;CO2; CO7
<b>Chapter 2.</b>	<b>External morphology</b>	<b>3</b>	
2.1.	External anatomy		CO1;CO2; CO3; CO7
2.2.	Body shape		CO1;CO2; CO3; CO7
2.3.	Scales		CO1;CO2; CO3; CO7
2.4.	Fins		CO1;CO2; CO3; CO7
<b>Chapter 3.</b>	<b>Internal morphology</b>	<b>3</b>	
3.1.	Internal organs		CO1;CO2; CO3; CO7

3.2.	Muscular system		CO1;CO2; CO3; CO7
3.3.	Skeletal system		CO1;CO2; CO3; CO7
3.4	Locomotion		CO1;CO2; CO3; CO7
<b>Chapter 4.</b>	<b>Respiratory system</b>	<b>3</b>	
4.1.	Gills		CO1;CO2; CO3; CO7
4.2.	Air-breathing fishes		CO1;CO2; CO3; CO7
4.3.	Fish oxygen requirements		CO1;CO2; CO3; CO7
<b>Chapter 5.</b>	<b>Blood and circulatory system</b>	<b>2</b>	
5.1.	Bloods		CO1;CO2; CO3; CO7
5.2.	Circulation system		CO1;CO2; CO3; CO7
<b>Chapter 6.</b>	<b>Reproductive system</b>	<b>4</b>	
6.1.	Reproductive anatomy		CO1;CO2; CO3; CO7
6.2.	Breeding behavior		CO1;CO2; CO3; CO7
6.3.	Development		CO1;CO2; CO3; CO7
6.4.	Sex change in fish		CO1;CO2; CO3; CO7
<b>Chapter 7.</b>	<b>Sensory system</b>	<b>3</b>	
7.1.	Lateral line		CO1;CO2; CO3; CO7
7.2.	Olfaction		CO1;CO2; CO3; CO7
7.3.	Taste		CO1;CO2; CO3; CO7
7.4.	Acoustic system		CO1;CO2; CO3; CO7
7.5.	Vision		CO1;CO2; CO3; CO7
<b>Chapter 8.</b>	<b>Fish classification and taxonomy</b>	<b>5</b>	
8.1.	Introduction		CO1;CO2; CO3; CO7
8.2.	Sharks and rays		CO1;CO2; CO3; CO7
8.3.	Bony fishes		CO1;CO2; CO3; CO7
8.4.	Other fishes		CO1;CO2; CO3; CO7

8.5	Taxonomic methods and application on fish identification in the Mekong Delta		CO1;CO2; CO3; CO7
<b>Chapter 9.</b>	<b>Shrimps</b>	<b>4</b>	
9.1.	External anatomy of shrimp		CO1;CO2; CO6
9.2.	Penaeidae		CO1;CO2; CO6
9.3.	Caridea		CO1;CO2; CO6
9.4.	Other crustaceans.		CO1;CO2; CO6

## 7.2. Practice

	Content	Hours	COs
<b>Unit 1.</b>	<b>Practice for fish identification</b>	<b>20</b>	
1.1.	Preserving, coding, photographing, and storing samples; retrieving external morphometrics from digital images.	5	CO4, CO5; CO6; CO7
1.2.	Measuring and counting external morphometrics and identification of fish.	5	CO4, CO5; CO6; CO7
1.3.	Anatomy of internal organs and musculoskeletal systems	5	CO4, CO5; CO6; CO7
<b>Unit 2.</b>	<b>Practice for shrimp identification</b>	<b>10</b>	
2.1.	Identification of Penaeidae	5	CO4, CO5; CO6; CO7
2.2.	Identification of Caridea and other crustaceans	5	CO4, CO5; CO6; CO7

## 8. Teaching methods:

Student-centered approach will be applied.

- Students study provided questions based on provided materials before classes.
- In class, lectures will be given and questions will be discussed.
- Practical experience with the use of real samples will be given.

## 9. Duties of student:

Students have to do the following duties:

- Self-studying before attendance at every course lesson.
- Attendance for course at least 80% number of time of theory parts
- Attendance 100% of the practical parts.

## 10. Assessment of course learning outcomes:

### 10.1. Assessment

No.	Point components	Rules and Requirements	Weights	COs
1	Practical points	-100% participating of practice classes - Completed the report and presentation	30%	CO1, CO2, CO3, CO4, CO5; CO6; CO7
2	Final exam point	90-minute writing examination	70%	CO1; CO2; CO3; CO7

## 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] Atsushi Ishimatsu, 2015. General Ichthyology. College of Fishery and Aquaculture, Can Tho University Press. 199p.	
[2] Koichi Shibukawa, 2015. Practice of General Ichthyology. College of Fishery and Aquaculture, Can Tho University Press. 141p.	
[3] Ha Phuoc Hung. 2018. Morphology and identification of fishes and shrimps. College of Fishery and Aquaculture, Can Tho University Press. 120p.	639H513 TS005684
[4] Tran Dac Dinh. 2013. Fishes of Mekong Delta, Vietnam. Can Tho University Press. 194p	333.95 M450
[5] Joseph, S. N., 1994, Fishes of the world. John Wiley & Sons, Inc., 600p.	597.01 N427/3rd
[6] Truong Thu Khoa and Tran Thi Thu Huong (1993). Identification of Mekong Delta Freshwater Fishes. 271p.	639.31 Kh 401
[7] FAO, 1974. The Living marine resources of the Western Central Pacific. Volume 2-6.	333.95 L785/Vol. 2; L785/Vol. 3-P.1; L785/Vol. 4-P.2; L785/Vol. 5-P.3 L785/Vol. 6-P.4.

## 12. Self-study Guide:

Week	Content	Theory (hours)	Practice (hours)	Student's Tasks
1	<b>Chapter 1: Introduction</b>	3	6	Read to Atsushi Ishimatsu, 2015. General Ichthyology. Chapter 1. From: p1-p45
2-3	<b>Chapter 2-3: External and internal morphology</b>	6	12	Review to Chapter 1. Atsushi Ishimatsu, 2015. General Ichthyology. Chapter 2. From: p46-p85
4	<b>Chapter 4: Respiratory system</b>	3	6	Review to Chapter 2. Read to Atsushi Ishimatsu, 2015. General Ichthyology. Chapter 3. From: p86-p105

5	<b>Chapter 5: Blood and circulatory system</b>	2	4	Review to Chapter 3. Read to Atsushi Ishimatsu, 2015. General Ichthyology. Chapter 4. From: p106-p120
6	<b>Chapter 6: Reproductive system</b>	4	8	Review to Chapter 4. Read to Atsushi Ishimatsu, 2015. General Ichthyology. Chapter 5. From: p121-p137
7	<b>Chapter 7: Sensory system</b>	3	6	Review to Chapter 5. Read to Atsushi Ishimatsu, 2015. General Ichthyology. Chapter 6. From: p138-p173
8-9	<b>Chapter 8: Fish classification and taxonomy</b>	5	10	Review to Chapter 6. Read to Atsushi Ishimatsu, 2015. General Ichthyology. Chapter 7. From: p174-p199
10	<b>Chapter 9: Shrimps</b>	4	8	Review to Chapter 7. Read to FAO, 1998. The Living marine resources of the Western Central Pacific. Volume 2. From: p852-971
11-13	<b>Chapter 10: Taxonomy of fishes and shrimps</b>	6	12	Review to Chapter 8. Read to Koichi Shibukawa, 2015. Practice of General Ichthyology. From: p1-p103
14-15	<b>Chapter 11: Practical ichthyology.</b>	4	8	Review to Chapter 9. Read to Koichi Shibukawa, 2015. Practice of General Ichthyology. From: p104-p141

ON BEHALF OF RECTOR  
DEAN OF COLLEGE



Vũ Ngọc Út

Can Tho, ...../...../20...

HEAD OF DEPARTMENT

Huỳnh Văn Hiến