

### COURSE OUTLINE DETAILS

**1. Subject: Biology of Fishes (Sinh học cá)**

- **Code:** AQ220

- **Credits:** 2

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

**2. Management Unit:**

- **Department:** Freshwater Aquaculture

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

**3. Requisites:**

- **Prerequisites:** No

- **Corequisites:** No

**4. Course objectives:**

Objectives	Descriptions	Program Outcomes
4.1	Provide to students the diversity of living fishes from hagfishes, lampreys to sharks, rays, and bony fishes; basic biological characteristics and some simple methods in fish biology that can be applied in aquaculture.	2.1.2a 2.1.2b
4.2	Train students' abilities of fish identification, sampling, biological characteristics analyzing, and selecting appropriate methods for observation fish biology.	2.2.1a
4.3	Develop skills in information searching, rational thinking, group working and creativeness	2.2.2
4.4	Strengthen habits of self-study and communication	2.3

**5. Course learning outcomes:**

COs	Descriptions	Objectives	POs
	<b>Knowledge</b>		
CO1	Identify the main biological characteristics of major groups of fishes.	4.1	2.1.2a
CO2	Describe the definitions and basic concepts of fish biology from taxonomy, nutrition, reproduction, age and growth, and larval development.	4.1	2.1.2a
CO3	Recognize appropriate methods for studying fish biology.	4.1	2.1.2b
	<b>Skills</b>		
CO4	Analysis the relationship between fish morphology and distribution, and behavior (locomotion, feeding, reproduction...)	4.2	2.2.1a
CO5	Select and apply criteria methods and appropriate measurement characteristics in observation of fish biology.	4.2	2.2.1a

CO6	Assemble and summarize information, references related to biology of aquatic animals; exchange information and work in group	4.3	2.2.2
	<b>Attitudes/Autonomy/Responsibilities</b>		
CO7	Develop students' ability of responsibility in learning, rational thinking and confidence	4.4	2.3

## 6. Brief description of the course

The course introduces to students the diversity of living fishes from hagfishes, lampreys to sharks, rays, and bony fishes with special biological characteristics; common concepts, principles, and fish behavior (from taxonomy, feeding, age and growth to reproduction and larval development). The course also provides some simple methods used in fish biological study and research that can be also applied in aquaculture practices.

## 7. Course structure:

### 71. Theory:

Units	Contents	Hours	COs
<b>Chapter 1</b>	<b>Introduction to fishes</b>	<b>2</b>	CO1, CO2, CO4
1.1	What they are		
2.2	Major groups of living fish		
<b>Chapter 2</b>	<b>General morphology</b>	<b>6</b>	CO2, CO3, CO4, CO5
2.1	Body form and fin		
2.2	Skin and scale		
2.3	The skeletal system		
2.4	Morphometric measurements		
2.5	Meristic counts		
2.6	Length - weight relationship and condition factor		
<b>Chapter 3.</b>	<b>Locomotion and Buoyancy</b>	<b>4</b>	CO2, CO3, CO4, CO5
3.1	Model of locomotion		
3.2	Buoyancy and the gas bladder		
<b>Chapter 4.</b>	<b>Food and feeding</b>	<b>6</b>	CO2, CO3, CO4, CO5, CO6
4.1	The alimentary canal: function and morphology		
4.2	Natural fish food		
4.3	Type of feeding		
4.4	Relative length of the gut		
4.5	Gut content analysis		
4.6	Food selection		
4.7	Structural modification in relation to feeding habit		
<b>Chapter 5.</b>	<b>Age and growth</b>	<b>4</b>	CO2, CO3, CO4, CO5, CO6
5.1	Principle of age determination		
5.2	Scale, otolith and other skeletal as age indicators		
5.3	Length frequency method		

5.4	Growth estimation		
5.5	Fitting growth curve		
<b>Chapter 6</b>	<b>Reproduction</b>	<b>8</b>	CO2, CO3, CO4, CO5, CO6
6.1	Anatomy of the reproductive system		
6.2	Sex differentiation		
6.3	Reproductive patterns		
6.4	Maturity stage		
6.5	Fecundity		
6.6	Early development in fishes		

### 8. Teaching method:

Teaching methods include lecturing, discussion and demonstration. Lectures are presented in powerpoint slides incorporated with video clips when needed. Reasoning questions will be asked during lecturing, which help students develop active thinking.

### 9. Duties of student:

Students have to do the following duties:

- Attending at least 80% theory hours in classroom
- Attending midterm examination and class activities.
- Preparing before classes all required reading and homeworks

### 10. Assessment of student learning outcomes:

#### 10.1. Assessment

No.	Point components	Rules and Requirement	Weights	COs
1	Participation	Attending 90% class hours Contributing to class discussion	5%	CO6, CO7
2	Homeworks	Submit on time	15%	CO4, CO5, CO6, CO7
3	Mid-term exam	Multiple choice and short-answer questions	20%	CO1, CO2, CO3, CO7
4	Final exam	Multiple choice and short-answer questions	60%	CO1, CO2, CO3, CO4, CO5, CO7

#### 9.2. 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.

### 10. Materials:

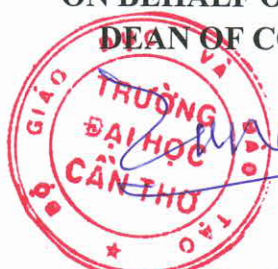
Materials information	Code number
[1] Bond, C.E, 1996. Biology of Fishes. Second edition. Saunders College Publishing, 750 pages	TS.000231
[2] Biswas, S.P, 1993. Manual of methods in fish biology. South Asian Publishers, New Delhi, 157 pages	TS.005785
[3] Nikosky, G.V., 1963. The ecology of fishes. Academic Press, London and New York.	TS.005905

### 11. Self-study Guide:

Week	Content	Theory (hours)	Practice (hours)	Students' duties
1	<b>Chapter 1. Introduction to fishes</b> 1.1 What they are 1.2 Major groups of living fish	2	0	<i>Before class:</i> + Read Chapter 1, reference [1]
2-4	<b>Chapter 2. General morphology</b> 2.1 Body form and fin 2.2 Skin and scale 2.3 The skeletal system 2.4 Morphometric measurements 2.5 Meristic counts 2.6 Length - weight relationship and condition factor	6	0	<i>Before class:</i> + Read chapter 2, reference [1] + Read chapter 5, reference [2]
5-6	<b>Chapter 3. Locomotion and Buoyancy</b> 3.1 Model of locomotion 3.2 Buoyancy and the gas bladder	4	0	<i>Before class:</i> + Read Part 2 and Part 3, Chapter 18, reference [1]  + Review Chapter 1 to Chapter 3 for mid-term exam
7-9	<b>Mid-term exam</b>  <b>Chapter 4. Food and feeding</b> 4.1 The alimentary canal: function and morphology 4.2 Natural fish food 4.3 Type of feeding 4.4 Relative length of the gut 4.5 Gut content analysis 4.6 Food selection 4.7 Structural modification in relation to feeding habit	6	0	<i>Before class:</i> + Read Part 1, Chapter 25, reference [1] + Read Chapter 7, reference [2]  <i>Homework:</i> Analysis the relation between morphology and feeding habit, describe and illustrate.
10-11	<b>Chapter 5. Age and growth</b> 5.1 Principle of age determination	4		<i>Before class:</i> + Read Chapter 9, reference [2] + Read Size, Growth and Age of fishes, Part II, reference [3]

	5.2 Scale, otolith and other skeletal as age indicators 5.3 Length frequency method 5.4 Growth estimation 5.5 Fitting growth curve			
12-15	<b>Chapter 6. Reproduction</b> 6.1 Anatomy of the reproductive system 6.2 Sex differentiation 6.3 Reproductive patterns 6.4 Maturity stage 6.5 Fecundity 6.6 Early development in fishes	8	0	<i>Before class:</i> + Read Function and Reproductive pattern, Chapter 26, reference [1] + Read Reproduction and Development of fishes, Part II, reference [3]  <i>Homework:</i> Summarize reproduction guilds and parental care of fishes distributed in the Mekong Delta, Vietnam.
16	<b>Final exam</b>			

ON BEHALF OF RECTOR  
DEAN OF COLLEGE



Vũ Ngọc Út

Can Tho, ..30.../...8.../2022  
HEAD OF DEPARTMENT



Phạm Thanh Liêm