

1. INFORMATION OF COURSE AND LECTURER

1.1 Course name and code: Physiology of Aquatic Organisms

1.2 Course specification: 2 cred. (theory: 1.3; Assignment: 0; Practice: 0.7); 40 hours (T: 20; A: 0; P: 20)

1.3 Prerequisites courses: No

1.4 Responsible Department: Department of Aquatic Nutrition and Products Processing.

1.5 Information of lecturer(s):

Name: Assoc. Prof. Dr. Do Thi Thanh Huong

Email: dtthuong@ctu.edu.vn

Co-teaching lecturer:

Name :

Email:

2. COURSE DESCRIPTION

The course on the physiology of aquatic organisms with a focus on fishes and crustaceans for master students is designed including the basic and applied subjects. The course consists of two parts, one is the theory and the other is the practical lessons. The aim of this subject is provide the students with knowledge of the mechanisms of fishes and crustaceans regarding (i) osmoregulation; (ii) respiration; (iii) energetical metabolism; (iv) digestive enzyme activities; (v) and the effects of the environmental parameters (such as temperature, salinity, toxic gases,...) on the mentioned mechanisms. The practical part consists of lessons such as (i) determination of oxygen consumption of fishes and crustaceans in different salinities; (ii) measurement of plasma osmolality of the fish and shrimp exposed to salinities, chemicals; and (iii) measurement of digestive enzyme activities and energetical metabolism of fishes and shrimp exposed to single and combined of chemicals and salinities. The students are expected to apply the studied knowledge for the improvement of aquaculture technologies and the conservation of aquatic resources.

3. COURSE EXPECTED LEARNING OUTCOMES

On completion of the course:

a) Theory (*knowledge and understanding*): the students should be able to understand and explain (i) the mechanism of fishes and crustaceans in the osmolality and ionic regulations; the respiration in water and air (air breathing fishes); the activities of digestive enzymes in stomach/intestine; the energetical metabolism; and (ii) the effects of environmental factors (such as salinities, dissolved oxygen, carbon dioxide, chemicals) on the ionic, osmolality regulation, or respiration and metabolism of fish and crustaceans. In addition, the students should be able to utilize gained knowledge in aquaculture technology.

b) Practice (*skills and ability*): the student should be able to measure and discuss (i) the osmolality, ion concentration in the plasma of fishes or crustaceans; (ii) the enzyme activities in the stomach, intestine of fishes or crustaceans; and (iii) bio-indicators such as ChE, LPO, catalase in the brain and muscles of fish.

4. COURSE CONTENTS

Chapters	Hours (T/A/P)
<p>Chapter 1: Osmoregulation of fishes and crustaceans.</p> <p><i>This chapter will provide the student with in-depth knowledge on the concept of osmolality, ionic concentration and mechanism of osmoregulation of freshwater fishes, marine fishes and crustaceans:</i></p> <p>1.1. The concept of osmoregulation</p> <p>1.2. The mechanism of ionic, osmolality regulation of fish and crustacea</p> <p>1.3. The tolerance of fishes and crustaceans to elevated salinities.</p> <p>1.4. In this chapter, the students will conduct practical project on the measurement of plasma osmolality and ion of fish and shrimps exposed to different salinities.</p> <p><i>In order to understand well this chapter, students should read references of [1], [2], [3], [4].</i></p>	5/0/5
<p>Chapter 2: Respiration of fish and crustacea.</p> <p><i>This 2nd chapter will provide the student with in-depth knowledge on on the oxygen absorbent and carbon dioxide excretion of the gill of fishes and crustaceans. This includes</i></p> <p>2.1. The mechanism of oxygen and carbon dioxide of the water breathing fishes and air breathing fishes;</p> <p>2.2. The mechanism of oxygen and carbon dioxide of the crustaceans;</p> <p>2.3. The respiration of fish in the hypoxia environment;</p> <p>2.4. The effect of environmental changes on the respiration of fishes and crustaceans.</p> <p>2.5. The students will do a practical project by group.</p> <p><i>In order to understand well this chapter, students should read references of [1], [2], [3], [4].</i></p>	5/0/5
<p>Chapter 3: The metabolism of energy in fishes and crustaceans</p> <p><i>This chapter will provide the students with knowledge on the mechanism of energy in fishes and crustaceans.</i></p> <p>3.1. The concept of energetic metabolism of aquatic organism.</p> <p>3.2. The effects of environmental factors on the energetic metabolism of aquatic animals;</p> <p>3.3. The analytical methodology of the energetic metabolism.</p> <p>3.4. The students will do a practical project by group.</p> <p><i>In order to understand well this chapter, students should read references of [1], [2], [3], [4].</i></p>	5/0/5

<p>Chapter 4: The activities of digestive enzymes in fishes and crustaceans</p> <p><i>This chapter will provide knowledge on the activities of digestive enzymes in fishes and crustaceans.</i></p> <p>4.1. The activities of digestive enzymes in stomach and intestine of fishes.</p> <p>4.2. The activities of digestive enzymes in stomach and intestine of crustaceans.</p> <p>4.3. The effect of environmental changes on the activities of digestive enzymes of fishes and crustaceans.</p> <p>4.4. The students will do a practical project by group.</p> <p><i>In order to understand well this chapter, students should read references of [1], [2], [3], [4].</i></p>	<p>5/0/5</p>
---	--------------

5. TEACHING AND ASSESSMENT METHODS

5.1. Teaching methods: The course will be taught in combination of theory (20 hours) and practice (20 hours). The students will use theoretical knowledge to conduct experimental projects and present their work in the class.

5.2 Assessment methods: Practical work/exam: 30% and Mid-term exam: 20% and Final theoretical exam: 50%.

6. READING REFERENCES

- [1] Graham J. B (1997). Air- breathing Fishes. Academic Press. 299 pp.
- [2] Johnston I. A and Bennett A. F. (1996). Animal and Temperature: Phenotype and Evolutionary Adaptation. Cambridge University press 419 pp.
- [3] Evans D. H and Claiborn (2006). The Physiology of Fish. 599 pp.
- [4] Do Thi Thanh Huong and Nguyen Van Tu (2010). Introduction to the physiology of fish and crustacean. 151 pp (in Vietnamese).

Date: 07 July, 2015

Lecturer