

1. INFORMATION OF COURSE AND LECTURER

- 1.1. Course name and code: APPLIED MICROBIOLOGY IN AQUACULTURE
- 1.2. Course specification: 2 Cred., 30 hours (Theory: 15; Assignment: 7; Practice: 8)
- 1.3. Prerequisites courses: Fish Health Management
- 1.4. Responsible Department:
- 1.5. Information of lecturer:
 - Name: Nguyen Thi Ngoc Tinh
 - Email: ntngoctinh@gmail.com
 - Co-teaching lecturer:
 - Name: Pham Thi Tuyet Ngan
 - Email: pttngan@ctu.edu.vn

2. COURSE DESCRIPTION

The course will provide the Master students with the following knowledge:

- Knowledge on the role of microorganisms, the processes, the ecological relationships in the aquaculture environment.
- Methodology for management of the beneficial microbial community in the aquaculture environment.
- Methods of isolation and screening of probiotic bacteria.
- Methods of probiotic manufacturing for commercialization.
- Methods for application of probiotic products in the hatcheries as well as in the grow-out ponds.

3. TEACHING METHODS AND ASSESSMENT

- 3.1. **Teaching methods:** Theoretical part accounts for 2/3 of total hours of the course. Self-study is assigned for the remaining 1/3 part, while the students have to work with literature, write assignment and present report with the evaluation of lecturer. Besides, field trips are organized with mini-project assignment at the end.
- 3.2. **Assessment methods:** Presentation 40%; Assignment and mini-project 40%; Final examination 20%.

4. COURSE CONTENTS

Chapters	Hours (T/A/P)
Chapter 1: Introduction on the role of microorganisms in aquaculture. <i>This chapter will provide basic knowledge on the characteristics and the role of different groups of microorganisms in aquatic</i>	3/2/1

<p><i>environment.</i></p> <ol style="list-style-type: none"> 1.1. Basic knowledge of microbiology 1.2. Microbial groups in the aquaculture environment (virus, bacteria, microalgae, protozoa) 1.3. Role of microorganisms in the aquaculture systems 1.4. Several studies on the application of microorganisms in aquaculture <p><i>References to be read: [2], [3] and [5]</i></p>	
<p>Chapter 2: Microbial ecology and microbial manipulation in the aquaculture environment.</p> <p><i>This chapter will provide knowledge on the processes of microbial ecology occurring in the aquatic environment, as well as knowledge on the microbial manipulation in aquaculture ponds.</i></p> <ol style="list-style-type: none"> 2.1. Processes of microbial ecology in aquatic environment 2.2. Relationships of microbial ecology in aquatic environment 2.3. Principles of microbial manipulation in aquaculture ponds 2.4. Application of microbial manipulation in aquaculture ponds <ol style="list-style-type: none"> 2.4.1. Microbial metagenomics studies 2.4.2. Bioflocs studies <p><i>References to be read: [5] and [7]</i></p>	5/2/2
<p>Chapter 3: Isolation, screening and manufacturing of probiotics</p> <ol style="list-style-type: none"> 3.1. Isolation, screening, identification, and preservation of bacterial cultures 3.2. Evaluation of the safety of probiotic isolates 3.3. Evaluation of the efficacy of probiotic isolates under <i>in vivo</i> conditions 3.4. Methods for probiotic manurefacturing <ol style="list-style-type: none"> 3.4.1. Fermentation processes 3.4.2. Centrifugation processes 3.4.3. Drying processes <p><i>References to be read: [4] and [6]</i></p>	5/1/3
<p>Chapter 4: Researches on the application of probiotics in aquaculture</p> <ol style="list-style-type: none"> 4.1. Internal and overseas researches on the application of probiotics 4.2. Application of probiotics in intensive shrimp culture 4.3. Probiotic products on the market, the use and economic effect <p><i>References to be read: [8] and [9]</i></p>	2/2/2

5. READING REFERENCES

- [1] Lương Đức Phẩm, 2002. Vi sinh vật học và an toàn vệ sinh thực phẩm. Nhà xuất bản nông nghiệp. Trang 1-130.
- [2] Nguyễn Lâm Dũng, Nguyễn Đình Quyền, Phạm Văn Ty, 2002. Vi sinh vật học. NXBGD. Trang 1-407.
- [3] Phạm Thị Tuyết Ngân, 2012. Bài giảng môn vi sinh vật hữu ích.
- [4] Phạm Thành Hồ, 2008. Nhập môn công nghệ sinh học. Nhà xuất bản Giáo dục, trang 1-311.
- [5] Trần Cẩm Vân, 2005. Giáo trình vi sinh vật học môi trường. Nhà xuất bản Đại học quốc gia Hà nội. Trang 1-159.
- [6] Trần Thị Thanh, 2008. Công nghệ vi sinh. Nhà xuất bản Giáo dục.
- [7] Moriarty, D.J.W., 1997. The role of microorganisms in aquaculture ponds. *Aquaculture* 151(1-4), 333-349.
- [8] Rengpipat, S., and S. Rukpratanporn, 1998. Probiotics in aquaculture: a case study of probiotics for larvae of the black tiger shrimp (*Penaeus monodon*), p. 193. In Book of Abstracts of the Fifth Asian Fisheries Forum - International Conference on Fisheries and Food Security beyond the Year 2000. Asian Fisheries Society, Chiang Mai, Thailand.
- [9] Verschuere, L., Rombaut G., Sorgeloos P., & Verstraete W., 2000. Probiotic bacteria as biological control agents in aquaculture. *Microbiology and Molecular Biology Review* vol. 64, No 4, 655-671.

Date:

Lecturer