MINISTRY OF EDUCATION AND TRAINING
CAN THO UNIVERSITY

SOCIALIST REPUBLIC OF VIETNAM
Independence - Freedom - Happiness

SUBJECT OUTLINE DETAILS

1. Subject: Plant Molecular Biology Lab.

- **Code:** BB857C
- **Credits: 01**
- **Hours:** 30 practice hours, 30 self-study hours.

2. Management Unit:

- **Department:** Molecular Biotechnology
- **Faculty/School/Institute/Center/Department:**

Biotechnology Research and Development Institute, Can Tho university

3. Prerequisites: .

4. Subject objectives:

The purpose of this course is to (i) help students gain a thorough understanding of the basic laboratory techniques in plant molecular biology; (ii) foster the development of laboratory technique and organizational skills at the bench; (iii) provide techniques including tools of DNA technology as well as the basic analysis of proteins; (iv) help students develop critical thinking skills in the interpretation and reporting of scientific data.

4.1. Knowledge:

Students will develop knowledge and understanding of:

4.1.1. The physical-chemical and biological principles of basic techniques and procedures used in molecular biology;

4.1.2. The exploration and utilization of bioinformatics resources;

4.2. Skill:

4.2.1. Ability to understand techniques and procedures used in plant molecular biology.

4.2.2. Ability how to keep a laboratory notebook and to gain the confidence and skills necessary to be able to attempt new laboratory procedures.

4.2.3. Develop critical thinking skills in the interpretation and reporting of scientific data.

4.3. Attitude:

4.3.1. Students are encouraged to develop positive values and informed critical attitudes.

4.3.2. Being hard-working student.

4.3.3. Honesty in presenting analysis results.

5. Brief description of subject content:

Plant molecular biology is the branch of biology that studies the structure and function of macro-molecules that encode and regulate the flow of genetic information used by living organisms. This subject will provide students with hands-on experience in the most basic laboratory methods used to isolate, clone and analyze nucleic acid sequences. Through a balanced combination of lectures, direct experimentation, and preparation of lab reports students will learn how to use current bioinformatics resources to identify specific DNA sequences, design primers for PCR amplification of these sequences which will be cloned, and sequenced. Students will carry out a basic structural analysis of the cloned sequences analyze some aspects of their pattern of expression. In addition, the class will carry out some plant transformation experiments.

6. Subject content structure:

6.1. Theory

Contents	Hours	Objectives
Lecture 1. Introduction to principles and techniques in molecular biology 1. Basic principles in laboratory 2. Techniques used in molecular biology	**5**	**4.1.1** **4.2.1** **4.2.2** **4.2.3** **4.3.1** **4.3.2** **4.3.3**
Lecture 2. DNA/Protein extraction 2.1. Protein extraction protocol 2.2. DNA extraction protocol 2.3. Spectrophotometry & Fluorometry 2.4. Restriction Enzyme Digestion 2.5. Agarose Gel Electrophoresis	**5**	**4.1.1** **4.2.2** **4.2.3** **4.3.1** **4.3.2** **4.3.3**
Lecture 3. Analytical Electrophoretic techniques in Protein chemistry 1.1. Introduction 1.2. Basic Principles of Electrophoresis in Polyacrylamide Gels 1.3. Construction of Gels 1.4. Running the Gel 1.5. Location of Protein on Gels 1.6. SDS-polyacrylamide Gel Electrophoresis 1.7. Other One-dimesional Eletrophoresis Methods 1.8. Isoelectirc Focusing 1.9. Two-dimensional Gel Electrophoresis	**5**	**4.1.1** **4.2.1** **4.2.2** **4.2.3** **4.3.1** **4.3.2** **4.3.3**
Lecture 4. Bioinformatics and PCR primer design 2.1. What is Bioinformatics? 2.2. PCR model 2.3. Primer design 2.4. PCR-based methods: factors influencing PCR' products	**5**	**4.1.1** **4.2.1** **4.2.2** **4.2.3** **4.3.1**

		4.3.2 **4.3.3**
Lecture 5. Cloning procedure 3.1. What is Clone? 3.2. Ligation 3.3. Transformation 3.4. Incubation 3.5. Plating	**5**	**4.1.1** **4.2.1** **4.2.2** **4.2.3** **4.3.1** **4.3.2** **4.3.3**
Lecture 6. Cloning/Sequencing 4.1. PCR colony screen 4.2. Agarose Gel Electrophoresis 4.3. Plasmid Purification 4.4. Agarose Gel Electrophoresis 4.5. Application of Cloning and Sequencing	**5**	**4.1.1** **4.2.1** **4.2.2** **4.2.3** **4.3.1** **4.3.2** **4.3.3**

7. Teaching method:

- Teaching and explaining each lecture.
- Providing supplements, case studies, homeworks.

8. Duties of student:

Students have to do the following duties:

- Lecture/Class attendance: not allow to be absent more than 20% of lectures.
- Laboratory Attendance: mandatory.
- Discussion problems and doing reports: mandatory

9. Assessment of student learning outcomes:

9.1. Assessment

No.	Point components	Rules and Requirement	Weights	Objectives
1	Reports	Each group include 2-3 students write a report at the end of class	40%	Evaluating knowledge for each lecture
2	Final exam	Observing samples to determine and explain bands on gels. Besides, replying some questions.	60%	Evaluating knowledge of whole subject

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.
- Subject score is the sum of all the components of the evaluation multiplied by the corresponding weight. The subject score is marked on a scale of 10 and rounded to one decimal place, then is converted to A-B-C-D score and score on a scale of 4 under the academic provisions of the University.

10. Materials:

Materials information	Code number
[1]. Plant Molecular Biology Lab Handout	File-BiRDI website
[2]. Walker, J.M., and W. Gaastra. 2007. Techniques in Molecular Biology. Croom Helm, London & Canberra	BiRDI Library
[3]. Weaver, RF. 2008. Molecular Biology. New York, NY. McGraw-Hill publisher. 5th edition, 892 pp.	BiRDI Library

11. Self-study Guide:

Week	Content	Theory (hours)	Practice (hours)	Students' duties
1	**Lecture 1. Overview of DNA structure and Extraction** 1. DNA/RNA structures 2. DNA Extraction 3. DNA qualification	6		Reading Chapter 14 and Chapter 15 [Material 2]; Part I-Chapter 1 [Material 3]
2	**Lecture 2. Cell cycle** 1. Stages in cell cycle 2. Methods of DNA analysis 3. Nuclear Genome	6		Reading Chapter 3, and Chapter 5 [Material 3]
3	**Lecture 4. Bioinformatics and PCR primer design** 1. PCR model 2. Primer design 3. Factors influencing PCR' products	6		Reading Part VIII-Chapter 25 [Material 3]
4	**Lecture 5. Cloning procedure** 1. Ligation 2. Transformation 3. Incubation 4. Plating	6		Reading Part II-Chapter 4 and Chapter 5 [Material 3]
5	**Lecture 6. Sequencing** 1. PCR screen 2. DNA Purification 3. Agarose Gel Electrophoresis 4.Application of Sequencing	6		Reading Part VIII-Chapter 24 [Material 3]

Can Tho, April/25/2014

ON BEHALF OF RECTOR
DEAN/ DIRECTOR

HEAD OF DEPARTMENT