

## **BOT 210 Phytobiotechnology**

(Lectures/Labs, 4 credits; CRN62355)

MW, 8:30am – 11:00pm, Hale 'Imiloa 106

<b>INSTRUCTOR:</b>	Hongwei Li Ph.D.
<b>OFFICE HOURS:</b>	Monday 11:00 am – 12:00 pm, or by appointment
<b>OFFICE:</b>	Hale 'Imiloa 107
<b>TELEPHONE:</b>	236-9104
<b>EMAIL:</b>	hli@hawaii.edu
<b>EFFECTIVE DATE:</b>	Spring 2018

### **WINDWARD COMMUNITY COLLEGE MISSION STATEMENT**

*Windward Community College is committed to excellence in the liberal arts and career development; we support and challenge individuals to develop skills, fulfill their potential, enrich their lives, and become contributing, culturally aware members of our community.*

### **COURSE DESCRIPTION**

This course provides an introduction to the principles and practical techniques of plant biotechnology. Topics include fundamentals of molecular biology, plant tissue culture and micropropagation, plant DNA and RNA extraction, PCR, DNA cloning, DNA sequencing, plant functional genomics, plant genetic engineering, gene silencing, molecular farming, and their applications. This course provides students hands-on experience and training in recombinant DNA technology, plant tissue culture and genetic engineering.

**Pre-Requisites:** BOT 101, or AG 152, or MICR 130 and MICR 140, or BIOL 171 and 171L, or consent of the instructor.

**Course satisfies:** DB and DY for AA in Liberal Arts, and elective for AS in Natural Sciences  
Required capstone for CA in Agripharmatech: Plant Biotechnology

### **Activities Required at Scheduled Times Other Than Class Times**

You will need to inspect and maintain the growth of your plant tissue cultures. You might have to carry out extended laboratory works at times other than scheduled laboratory periods.

### **STUDENT LEARNING OUTCOMES**

1. Understand the basic principles of molecular biology.
2. Understand and be able to perform experiments involving recombinant DNA.
3. Understand the principles, techniques and applications of plant tissue culture.
4. Understand the principles and techniques of plant genetic transformation mediated by agrobacterium and particle bombardment.
5. Understand the principles and techniques of plant functional genomics.
6. Discuss the benefits, issues, and risks of biotechnology

## ASSESSMENT TASKS AND GRADING

Your learning outcomes will be achieved through the aid of the following activities:

1. Assigned readings (hand-outs)
2. Laboratory participation
3. Lab reports.
4. Homework assignments and presentation.

You will be evaluated based upon the performance in class and laboratory activities, laboratory reports, the ability to maintain aseptic cultures, presentation, and exams as described below.

### ***Lecture and Laboratory Participation (50 points)***

You are expected to participate in all lecture and lab activities. You will also work safely and efficiently in the laboratory. Thus, you will be graded on lecture and laboratory attendance, level of participation, and laboratory notebooks. Because of the difficulties in setting up laboratory material, students missing a regularly scheduled laboratory activity cannot be given an alternative assignment. Failure to participate in a scheduled laboratory session will result in a 15-point deduction for each session missed.

### ***Laboratory Safety Compliance (50 points)***

You must purchase a lab coat and a pair of safety glasses. You must follow standard laboratory operating procedures and safety guidelines during lab practices.

### ***Laboratory Reports (150 points)***

Your laboratory reports will be examined three times during the semester. Each lab report should consist of followings:

*Title of the experiment*

*Introduction*

*Materials*

*Methods*

*Results and Conclusions*

### ***Maintenance of Plant Tissue Culture (50 points)***

You will maintain your own *in vitro* cultures. Assessment will be based upon non-contaminated and healthy cultures throughout the semester. Media transfer should be done accordingly. You should detect contaminated cultures as early as possible to repeat the operation before the end of the semester.

### ***Presentation (50 points)***

You will select one of topics on the benefits, issues, and risks of plant biotechnology and give a presentation in class. You will be graded based on your presentation and participation of discussion on those topics.

### ***Exams (200 points)***

There are two exams (midterm and final) to assess your knowledge and skills in plant biotechnology. Exams are non-cumulative.

Make up exams will only be given with a valid reason (i.e. medical or other emergency) on the FIRST day you return to class. In such a circumstance, you should make every reasonable attempt to contact the instructor as soon as possible before the exam. Students involved in cheating will receive an "F" grade for the course.

## Grading

The total possible points:

1. Lecture and Laboratory Participation	50	points
2. Laboratory Safety Compliance	50	points
3. Laboratory Reports	150	points
4. Maintenance of Plant Tissue Culture	50	points
5. Presentation	50	points
6. Exams (2)	200	points
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Total	550	points

Letter grades will be assigned as follows:

A - - - 90% or above in total points.

B - - - 80-89% of total points.

C - - - 70-79% of total points.

D - - - 60-69% of total points.

F - - - Below 60% of total points

I - - - Incomplete; given at the INSTRUCTOR'S DISCRETION when you are unable to complete a small part of the course because of circumstances beyond your control. It is your responsibility to contact the instructor to make up incomplete work with a minimum level (or better) of achievement. Failure to satisfactorily make up incomplete work within the appropriate time period will result in a grade change for "I" to the contingency grade identified by the instructor (see catalog).

## LEARNING RESOURCES

**Textbook:** There is no required textbook.

**Lecture materials / Reading Hand-outs:** <https://laulima.hawaii.edu/portal>

## DISABILITIES ACCOMMODATION STATEMENT

*If you have a physical, sensory, health, cognitive, or mental health disability that could limit your ability to fully participate in this class, you are encouraged to contact the Disability Specialist Counselor to discuss reasonable accommodations that will help you succeed in this class. Ann Lemke can be reached at 235-7448, [lemke@hawaii.edu](mailto:lemke@hawaii.edu), or you may stop by Hale 'Akoakoa 213 for more information.*

## BOT 210 Schedule

Spring 2018

### Week 1

Lecture Course introduction and overview of plant biotechnology  
Lab Standard laboratory operating and safety procedures  
Equipment operation

### Week 2-3

Lecture Principles and applications of plant tissue culture  
Lab Preparation and sterilization of solution and media  
Aseptic techniques, surface sterilization of Arabidopsis seeds and germination

**Week 4-5**

Lecture Contamination issues in plant tissue culture  
Lab Micropropagation of pineapple using crown tip meristem

**Week 6-7**

Lecture Reviews: principles and techniques of molecular biology  
Lab Subculturing and callus initiation

**02/26*****Midterm Exam*****Week 8-9**

Lecture Plant transformation using agrobacterium and particle bombardment  
Lab Agrobacterium culture and co-cultivation with explants

**Week 10-11**

Lecture Selection and regeneration of transgenic plants  
Lab Subculture, selection, and GFP assay

**Week 12*****Spring Recess*****Week 13-14**

Lecture Characterization of genetic modified (GM) plants  
Lab Analysis of GM plants: Plant DNA/RNA extraction and detection of transgenes by PCR and RT-PCR.

**Week 15**

Lecture Principles of genome analysis and functional genomics of plants  
Lab Analysis of GM plants: DNA sequencing, and detection of transgene expression by RT-PCR.

**Week 16**

Public concerns and issues in plant biotechnology: case study and student presentation.

**05/09****Final Exam 08:30am -10:30am**

(Please note that the schedule is subject to change.)