BOT 210 Phytobiotechnology
04
MW 01:30 pm – 04:00 pm (62302)

INSTRUCTOR: Ingelia White Ph.D.
OFFICE: Imiloa 102
OFFICE HOURS: MW 9:00 am – 1:00 pm or by appointment
TELEPHONE: 236-9102
EFFECTIVE DATE: Fall 2009

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.

CATALOG DESCRIPTION
Introduction to practical aspects of Plant Biotechnology. This course is designed to train students for careers in advanced agriculture technology and industry (3 hrs. lect.; 3 hrs. lab.).

Prerequisites: BOT 101, or AG 152, or MICRO 130 and MICRO 140, or BIOL 171/171L, or consent of the instructor.

WCC: AA (DB/DY), ASC in BRT-Plant Biotechnology
UHM: B.Sc in PEB

Activities Required at Scheduled Times Other Than Class Times
You will need to inspect and maintain the growth and development of your plant tissue, cell, and/or protoplast cultures. You might have to carry out extended laboratory works at times other than scheduled laboratory periods.

STUDENT LEARNING OUTCOMES
The student learning outcomes for the course are:
1. Apply the principles of genetics
2. Discuss and perform experiments including plant/bacterial/human DNA/protein electrophoresis, Southern and Western blots, plant genetic engineering using biolistic bombardment and bacterial gene transformation
3. Apply bioinformatics and DNA sequencing
4. Discuss bioethical issues, risks and benefits of biotechnology
5. Produce lab reports using the standard scientific format

COURSE TASKS & GRADING
You will be evaluated based upon class and laboratory participation, laboratory reports, a field trip report, the ability to maintain aseptic cultures, and examinations as described below.

Lecture and Laboratory Participation
You are expected to participate in all lecture and lab activities (50 points). 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 work habits. 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. If you are missing more than four three-hour laboratory sessions, you will not receive credit for the course.

**Laboratory Reports**
You will complete a total of two written formal cumulative laboratory reports (200 points). Each lab report consists of modules assigned for specific lab periods. Lab reports must be completed and turned in on the days of Midterm and Final Exam (see schedule of lectures and labs).

**Field Trip Report**
Field trip is mandatory. One field trip report (50 points) should be turned in within a week following the trip.

**In Vitro Culture Maintenance**
You will maintain your own in vitro cultures (50 points). 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.

**Examinations**
There are two unit examinations (400 points) to assess your knowledge and skills in plant biotechnology. Exams are non-cumulative.

**METHOD OF GRADING:**
The assignment of points will be described by the following protocol:
- Lecture and laboratory participation………………   50 points
- Cumulative laboratory reports (2)………………… 200 points
- Field trip report (1)………………………………... 50 points
- *In vitro* culture maintenance……………………….   50 points
- Exams (2)…………………………………………   400 points

<table>
<thead>
<tr>
<th>Total</th>
<th>750 points</th>
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Letter grades will be assigned as follows:
- A - - 90% or above in total points.
- B - - 80-89% of total points.
- C - - 65-79% of total points.
- D - - 55-64% of total points.
- F - - Below 55% of total points; or incomplete official withdrawal from the course.
- 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 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).
- CR - - 65% or above in total points; your must indicate an intent to take the course as **CR/NC** in writing by the end of the 10th week of classes (see catalog).
NC - Below 65% of total points; for BOT 210, this grade only available under the CR/NC option (see above and catalog); the NC grade will not be used as an alternative grade for an "F".

N- - - NOT GIVEN BY THIS INSTRUCTOR EXCEPT UNDER EXTREMELY RARE CIRCUMSTANCES (e.g., documented serious illness or emergency that prevents the student from officially withdrawing from the course); never used as an alternative for an "F" grade.

W- - - Official withdrawal from the course after the third week and prior to the end of the 10th week of classes (see catalog).

Waiver of minimum level of achievement will be given only in unique situations at the instructor's discretion. Students involved in academic dishonesty will receive an "F" grade for the course.

STUDENT RESPONSIBILITIES:
You should carefully review the attached sheet detailing the inherently dangerous activities of this course and sign the appropriate U.H. Assumption of Risk and Release and Medical Consent forms.

You are expected to attend all lecture and laboratory sessions and participate in all activities and complete all course assignments on time.

You are expected to be prepared when you arrive for class. Being prepared includes the following: having already read text material (e.g., textbook and handouts) assigned for that day's activities; and bringing required work materials (e.g., writing supplies, textbooks, handouts etc.).

Any changes in the course schedule, such as examination dates, deadlines, etc., will be announced ahead of time in class. It is your responsibility to be informed of these changes.

It is your responsibility to be informed about deadlines critical to making registration changes (e.g., last day of erase period and last day for making an official withdrawal).

You should understand BOT 210 is a rigorous class requiring serious attention and study. While the instructor assumes that students enrolled in BOT 210 have little science background, you should expect a level of difficulty comparable to other introductory science classes for pre-professionals. When difficult concepts and detailed information are presented, it is your responsibility to take the appropriate steps to learn and understand these concepts and information.

Science courses at W.C.C. generally require two to three hours of independent private study time for each hour in class (depending upon your science background). It is your responsibility to allocate the appropriate time needed for study in an environment conducive to quality study. You must budget time efficiently and be realistic about all personal and professional commitments that consume time.

HOW TO SUCCEED IN THIS CLASS
Understanding plant biotechnology involves understanding an extended vocabulary and many challenging concepts from many science disciplines, not just knowing facts. You should know that the details to these concepts are important. In addition, you will be introduced to hundreds of new words. In some cases, words that are familiar to you in a context other than biology will be introduced to you. However, you will need to understand and use these terms in a biological context.
You should take careful pre-lab notes and read the corresponding material in the textbook and handouts. As soon as possible (best if you do it the same day), copy over your notes filling in gaps and missing information by referring to the textbook and handouts. You should carefully review these rewritten notes as often as possible. In addition to reviewing these notes before an exam, it would be useful to try to rewrite these notes from memory.

In addition to copying over your notes, your study activities should include drawing your own labeled diagrams or graphs that illustrate important concepts or details. These diagrams should clearly illustrate significant information. Before an exam, it would be useful to redraw these labeled diagrams and graphs from memory.

Make flashcards for each new vocabulary word you learn. Read the textbook and handouts corresponding to a particular lecture and lab before and after the class. Review these materials before exams.

“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, or you may stop by Hale ‘Akoakoa 213 for more information”.

LEARNING RESOURCES

- Handouts (lab protocols, etc.,).
- Videos:
  - Plant Tissue Culture
  - Gene Technology in Agriculture
  - Guide to DNA Biotechnology
  - Molecular Cloning of DNA
  - Cutting and Splicing DNA
  - Manipulating DNA
  - Restriction Enzyme and DNA
- My websites:
  - http://www.wcc.hawaii.edu/facstaff/white-i
  - http://www.wcc.hawaii.edu/facstaff/white-i/medgarden.html
  - http://www.wcc.hawaii.edu/facstaff/white-i/plantID.html
  - http://www.wcc.hawaii.edu/facstaff/white-i/studentsuccess.html
  - http://www.wcc.hawaii.edu/facstaff/white-i/labs.html
  - http://www.wcc.hawaii.edu/facstaff/white-i/climatelab.html
  - http://www.wcc.hawaii.edu/facstaff/white-i/kuhilaaulab.html
  - http://www.wcc.hawaii.edu/facstaff/white-i/tissuelab.html
  - http://www.wcc.hawaii.edu/facstaff/white-i/courses.html
  - http://www.wcc.hawaii.edu/facstaff/white-i/cv_white.html
## SCHEDULE OF LECTURES AND LABS:

**BOT 210, Fall 2009**

Holidays: Sept.7, Nov. 11, 26, 27

<table>
<thead>
<tr>
<th>Date</th>
<th>Chapter</th>
<th>Lecture*</th>
<th>Lab</th>
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<tbody>
<tr>
<td>8/24</td>
<td>1</td>
<td>Overview of Biotechnology</td>
<td>Understanding DNA</td>
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<tr>
<td>8/26, 8/31</td>
<td>3</td>
<td>Genes, Genetics &amp; Geneticists</td>
<td>Aseptic technique</td>
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<tr>
<td>9/2, 9/9</td>
<td>4</td>
<td>Overview of Molecular Biology</td>
<td>Media preparation</td>
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<tr>
<td>9/14</td>
<td>35</td>
<td>Science, Technology &amp; Society</td>
<td>Tissue culture (seed, ovule, ovary)</td>
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<td>9/16</td>
<td>36</td>
<td>Rational Analysis</td>
<td>Tissue culture (root, stem, leaf)</td>
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<td>9/21</td>
<td>37</td>
<td>Debating the Risks</td>
<td>Protoplast culture</td>
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<td>9/23</td>
<td>38 - 39</td>
<td>Bioethical Issues &amp; Case Study</td>
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<td>9/28</td>
<td>40</td>
<td>Gene Therapy</td>
<td>Bioinformatics</td>
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<td>9/30</td>
<td>34</td>
<td>Bioinformatics</td>
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<tr>
<td>10/5</td>
<td>5</td>
<td>Recombinant DNA Technology</td>
<td>DNA spooling</td>
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<td>10/7</td>
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<td>App.B</td>
<td>Careers in Biotechnology</td>
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<td></td>
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<td>Lab Biosafety</td>
<td>Isol. of chloroplast/mitochondria</td>
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<td>10/12</td>
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<td>Guest speaker from Monsanto Co.</td>
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<td><strong>10/14</strong></td>
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<td>Mid-term</td>
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<tr>
<td>10/19, 10/21</td>
<td>10</td>
<td>DNA Extraction</td>
<td>Extr. of plant genetic DNA, and sequencing</td>
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<td>10/26</td>
<td>11 - 12</td>
<td>Restriction Enzymes</td>
<td>Gel electrophoresis</td>
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<td>10/28</td>
<td>16</td>
<td>Detection of Spec. DNA Sequences</td>
<td>Amplification of DNA via PCR</td>
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<td>11/2</td>
<td>17</td>
<td>Polymerase Chain Reaction</td>
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<td>11/4</td>
<td>18</td>
<td>DNA Sequencing</td>
<td>(RAPD) &amp; application</td>
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<td><strong>11/9</strong></td>
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<td>Field Trip (Pacific Rim Summit Conference)</td>
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<td>26</td>
<td>Nat. &amp; Meth. of Plant Genetic Eng.</td>
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<td>11/23</td>
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<td>Guest speaker from Pioneer Hi-Bred</td>
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<tr>
<td>11/25, 11/30</td>
<td>19</td>
<td>Transformation of E.coli</td>
<td>Biolistic: PDS 1000/He</td>
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<td>12/2</td>
<td>20</td>
<td>Conj. Transfer of Antibio. Resist.</td>
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<tr>
<td>12/7, 12/9</td>
<td>21</td>
<td>Transd. of Antibio. Resist. Gene</td>
<td>Conjugative plasmid</td>
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<td><strong>12/14</strong></td>
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<td>Final Exam</td>
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*Subject to change