Biology 275 Cell & Molecular Biology Lab  

GENERAL INFORMATION  Fall 2011

Meeting:  2:00—4:30  Monday  
Location: Hale Imiloa106
Faculty:  Dr. Teena Michael  
Office: Hale Imiloa107
Telephone: 808 236-9104 (x104 on campus)  
Email: teena@hawaii.edu
Office hours: Friday 1:45-3:30 and other times by appointment

THE COURSE:  This laboratory course for Cell & Molecular Biology (2.5 hours) accompanies the lecture course.  Through this course we will investigate both techniques and questions that are central to the structure and function of the cell.

Successful completion of the course should provide students with the following Learning Outcomes:

• The ability to operate equipment used in cell and molecular biology laboratory
• The ability to conduct observations and experiments including DNA/RNA/protein extraction and electrophoresis, enzyme kinetics, ELISA, RFLP, PCR and gene expression
• The ability to produce lab reports using the standard scientific format.

COURSE GOALS:
• Students will become familiar with the procedures and techniques currently being used in the field of Cell & Molecular Biology.
• Develop skill at collecting and analyzing data.
• Develop the ability to integrate and extend your knowledge received from BIOL 275.

COURSE OBJECTIVES:
You will be able to perform and analyze the following laboratory activities:
• Protein and DNA electrophoresis
• Fluorescence and immuno fluorescence microscopies
• Enzyme kinetics and enzyme-linked immunosorbent assay (ELISA)
• Assembly of microtubules
• DNA and RNA isolation
• Restriction enzyme analysis
• Polymerase Chain Reaction
• Control of gene expression

REQUIREMENT COURSE SATISFIES:

AT WCC:  Partially fulfills requirements for the Academic Subject Certificate in Bio-Resources and Technology (Plant Biotechnology Program).

AT UHM:  Partially fulfills Bachelor’s degree requirements in the following majors: Molecular Biosciences and Biosystem Engineering, Plant and Environmental Biotechnology, Medical Sciences, Biology, Botany, and Horticulture.

CO-REQUISITES:  BIOL 275 or consent of instructor.
RECOMMENDED SPECIAL PREPARATION:
ICS 101 or ICS 105 B - E, Calculus or Algebra

MODE OF INSTRUCTION:
• Laboratory lecture and multimedia presentations
• Active participation in laboratory
• Laboratory notebook
• Laboratory summaries

EVALUATION OF OBJECTIVE ACHIEVEMENT:

Lab Notebook. You will be required to keep a notebook. It should be used to organize any notes, handouts, observations/data, information gathered before and during laboratory activities and lab summaries. Having a notebook insures that your data will not be misplaced. You should always bring your notebook and lab manual to the lab. Your notebook will not be graded but will be checked.

Lab Summaries. Learning how to write concise laboratory summaries about your experiences with individual experiments is an important part of scientific research. Laboratory summaries not only allow you to hone your writing skills, but also help you organize and evaluate your results in a scientific manner. Lab summary includes the following parts: purpose (objective), data, and conclusion (see Format for Laboratory Summaries).

Your laboratory summaries are part of your lab notebook. They are handed to me to be corrected and should be inserted into your notebook once they are returned to you. It is recommended that all laboratory summaries are done on the computer, however, it is also recommended that all graphs be done by hand to ensure you understand the concepts associated with the laboratories. All summaries are due at the start of each new lab session, unless otherwise noted. Late summaries will not be accepted.

Lab Attendance. Attendance is mandatory. Because laboratories involve considerable set-up/take-down time and supervision, you will not be able to make-up missed laboratory activities.

METHOD OF GRADING:

Your performance in this lab will be evaluated based on the following components:

<table>
<thead>
<tr>
<th>Component</th>
<th>Points</th>
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<tbody>
<tr>
<td>10 Pre-lab quizzes</td>
<td>30 points</td>
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<tr>
<td>10 Lab summaries (30 points each)</td>
<td>300 points</td>
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<tr>
<td>2 Lab examinations (100 points each)</td>
<td>200 points</td>
</tr>
<tr>
<td>Lab Notebook</td>
<td>10 points</td>
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<tr>
<td>Group Project</td>
<td>40 points</td>
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<tr>
<td>Total</td>
<td>580 points</td>
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Letter grades will be assigned as follows:

A ..........90% or above in total points and not missing more than one scheduled lab activity.
B ..........80 – 89.9% of total points and not missing more than one scheduled lab activity.
C………65 – 79.9% of total points and not missing more than one scheduled lab activity.
D………55 – 64.9% of total points and not missing more than one scheduled laboratory activity.
F………Below 55% of total points or informal or incomplete official withdrawal from course, or if you miss more than one scheduled lab activity for reason other than documented illness or emergency.
I………..Incomplete; given at the instructor’s option 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. Failure to satisfactorily make up incomplete work within the appropriate time period will result in a grade change for “I” to contingency grade identified by the instructor (see catalog); may be issued if documented serious illness or emergency forces you to miss more than one scheduled lab activity.
CR………65% or above in total points; you must indicate the intent to take the course as CR/N in writing by the end of the 10th week of classes (see catalog).
NC………Below 65% of total points; this grade only available under the CR/N option (see above and see Catalog).
N……….Not given by this instructor except under extremely rare circumstances (e.g. documented serious illness or emergency that prevents you 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).

STUDENT RESPONSIBILITIES:

You should carefully review the attached Laboratory Safety Regulations and Cleaning Up procedures. You should also sign the appropriate U.H. Assumption of Risk and Release (in your Lab Manual).

You are expected to participate in all lab activities and complete all lab assignments on time. You are expected to be prepared in advance when you arrive to class. Being prepared includes the following: having already read text materials (e.g. lab manual, notebook and handouts) assigned for that day’s activities, bringing required work materials (e.g. lab notebook, lab manual, handouts, writing supplies, lab coat, goggle, gloves), and having completed any assigned pre-lab tasks.

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

LAB MANUAL AND OTHER INSTRUCTIONAL MATERIALS
Modern Biology Handouts will be distributed in class.
BIOL 275L LABORATORY SCHEDULE 2011

<table>
<thead>
<tr>
<th>WEEK</th>
<th>DATE</th>
<th>LAB</th>
<th>TOPIC</th>
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<tbody>
<tr>
<td>1</td>
<td>8/22</td>
<td>1</td>
<td>Introduction and ELISA</td>
</tr>
<tr>
<td>2</td>
<td>8/29</td>
<td>2</td>
<td>Protein Electrophoresis I Native</td>
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<tr>
<td>3</td>
<td>9/5</td>
<td>3</td>
<td>HOLIDAY</td>
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<tr>
<td>4</td>
<td>9/12</td>
<td>3</td>
<td>Protein Electrophoresis II &amp; Microscopy</td>
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<tr>
<td>5</td>
<td>9/19</td>
<td>4</td>
<td>Enzyme Kinetics</td>
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<tr>
<td>6</td>
<td>9/26</td>
<td>5</td>
<td>Membrane Permeability &amp; Microscopy</td>
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<tr>
<td>7</td>
<td>10/3</td>
<td>6</td>
<td>EXAM 1</td>
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<tr>
<td>8</td>
<td>10/10</td>
<td>7</td>
<td>UH Biological Microscopy Facility</td>
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<tr>
<td>9</td>
<td>10/17</td>
<td>8</td>
<td>Receptors</td>
</tr>
<tr>
<td>10</td>
<td>10/24</td>
<td>9</td>
<td>Assembly of microtubules</td>
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<tr>
<td>11</td>
<td>10/31</td>
<td>10</td>
<td>Biofilms and the ECM</td>
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<tr>
<td>12</td>
<td>11/7</td>
<td>11</td>
<td>DNA Isolation, Electrophoresis &amp; Mitosis</td>
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<tr>
<td>13</td>
<td>11/14</td>
<td>12</td>
<td>Restriction Analysis</td>
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<td>14</td>
<td>11/21</td>
<td>13</td>
<td>RNA Isolation</td>
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<tr>
<td>15</td>
<td>11/28</td>
<td>14</td>
<td>Polymerase Chain Reaction (PCR) &amp; Control of Gene Expression</td>
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<tr>
<td>16</td>
<td>12/5</td>
<td>15</td>
<td>FINAL</td>
</tr>
</tbody>
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* Note: Students will collectively complete a project that involves light and epifluorescence microscopy. The project will be discussed in class.

Format for Laboratory Summaries

Lab #. & Title

Purpose:
This section should tell me what you expect to observe or find out by performing the experiment and how you will conduct your experiment. This section should be 2 - 6 sentences long.

Results/Data:
This is the section where you will include your figures and tables as well as any information for the laboratory (color, number of colonies, pictures of gels, etc.). Please follow the following format for tables and figures:

Table 1. The number of *Staphylococcus aureus*, *S. epidermidis* and *Micrococcus luteus* in MSA broth incubated in 37°C for 2 days.

<table>
<thead>
<tr>
<th>Bacteria</th>
<th>Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Staphylococcus aureus</em></td>
<td>720,000</td>
</tr>
<tr>
<td><em>Staphylococcus epidermidis</em></td>
<td>598,000</td>
</tr>
<tr>
<td><em>Micrococcus luteus</em></td>
<td>12,000</td>
</tr>
</tbody>
</table>
Figure 1. Numbers of three bacteria cultures in MSA broth for 2 days in 37°C

**Conclusion:**
This is your discussion! Please tell me what went on and what the outcome was. Please be precise but not verbose. Also comment on any erroneous results. This will turn out to be your longest and the most important part of your lab summary.

**Questions and Answers:**
Answers can be integrated into your discussion part.

NON-DISCRIMINATION POLICY

_The University of Hawaii is committed to a policy of non-discrimination on the basis of race, sex, age, religion, color, national origin, ancestry, disability, marital status, arrest and court record, sexual orientation, or veteran status in all of its programs, policies, procedures, or practices. This policy covers admission and access to, participation, treatment and employment in university program and activities._

“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.”
LABORATORY SAFETY REGULATIONS

- No smoking, drinking, or eating is allowed in the laboratory.
- Bare feet are not allowed in the laboratory. Always wear covered shoes.
- You should tie back your hair, if it is long.
- A lab coat must be worn in the laboratory at all times. You must wear gloves and goggle for any laboratory using hazardous chemicals or microbes (they can be purchased at the campus bookstore).
- Broken glassware, slides, and cover slips must be disposed of in the “GLASS ONLY” box.
- Handle all hazardous chemicals and bacterial cultures with extreme care.
- Wash your hands after each lab and during, if necessary.
- Never mouth pipette a chemical.
- Never taste a chemical in the laboratory unless you are specifically instructed to do so by your instructor.
- Laboratory equipment should be used only after you have been instructed in its proper operation.
- Anyone attempting unauthorized experiments in the laboratory will be subject to disciplinary action.
- If you are in doubt concerning any laboratory procedure, consult with your instructor. Do not act in ignorance.
- Do not run in the laboratory. An accident may cause serious injury.
- Know how to look up various chemicals in the Material Safety Data Sheets (MSDS folder).
- Commit to memory the locations of the first aid kit, the fire extinguisher, the emergency shower and the emergency eyewash, as well as important emergency telephone numbers.
- **Report all injuries to your instructor immediately.**

CLEANING UP

- Properly clean and put away any instruments or equipment you have used.
- Wash and put back any items you used from your drawer.
- Clean and return all other supplies to your instructor or to their proper places.
- Wipe down your table before and after each lab period with disinfectant.
- Hazardous chemicals used in the lab must be disposed of in the proper containers.
- Paper, glass, gravel, and other solid waste should not be disposed of in the laboratory sinks.
- Discard all biologically contaminated items into the red Biohazard containers.