New York University
School of Engineering
Department of Chemical and Biological Sciences

Course Outline
BMS 3114 Lab: Genetics Laboratory

Fall 2017
Professor Lam

To Contact Professor: Email: rl1385@nyu.edu
Office Hours: Appointment only

Course Pre-requisites:
BMS 1004
Pre/Co-requisite CM 2213 or CM 2214

Course Description:
Practical application of the techniques used to study genetic phenomena in prokaryotes, eukaryotes and viruses. The course emphasizes Mendelian and molecular approaches to genetic research. In addition the course will provide an introduction to bioinformatic research techniques.

Course Objectives:
- To become familiar with techniques and practical application of Mendelian genetics, including statistical analysis of experimental results.
- To become familiar with the application and techniques of modern genetic technology at the molecular level.
- To describe experimental procedures and results in written format both informal through the use of a lab notebook, and in formal lab reports.

Required Reading:
There is no formal lab manual – All exercises are posted on Blackboard and must be read before class. A print copy of the day’s exercise(s) must be brought in to class.

Requirements:
- Students are required to attend and to be on time for ALL laboratories and to be prepared by pre-reading the assigned laboratory exercises BEFORE coming to class.
- Two unexcused missed labs will result in an automatic failure of the course. Entering the lab more than 15 minutes after the schedules start time counts as a lateness. Two late = 1 absence.
- Lab coat- Must be worn at all times while in the lab. No Exceptions.
- Shorts, Short skirts, and open-toed shoes are not to be worn in the laboratory.
- Food and Beverages are strictly forbidden from the laboratory.
- Lab Notebook – Bound notebook (Not Spiral) must be brought to every lab session.
- Four lab reports will be required for the course.
- There will be one mid-semester exam and a cumulative final exam.
- Lab notebook will be graded throughout the semester.
- Periodic Quizzes at the beginning of class will cover the pre-lab reading.
- Technique Points will be awarded to each student at the end of each lab session by the instructor and teaching assistant. These points are based on several factors including but not limited to: Preparedness, lab technique, neatness, teamwork, organization and experimental results.

**Lab Grading:**
- Midterm: 20%
- Cumulative Final Exam: 30%
- Four Lab Reports: 25%
- Lab Technique: 10%
- Notebook and Quizzes: 15%

**Laboratory Notebook:**
The lab notebook is the place where you will record what you have done and what you have found out, in a neat and orderly manner. Keeping accurate records is critical to the process of scientific discovery. In Industry, the lab notebook is often vital to the patenting process, especially if there is litigation over priority. Many companies require that each day’s work be signed by the investigator and a witness, and in many cases, notebooks are periodically collected and notarized. Each company publishes its own, very stringent set of regulation for lab notebooks.

You will need to keep a lab notebook for this course which must be brought to every class. Notebooks will be checked periodically without warning.

While in lab, all methods/steps actually performed should be documented as you execute them with the details such as exact measurements and observations. Any notes or changes to protocol need to be documented, in addition to work done. You should record the times when you start and stop a procedure, do not rely on your memory. Record the raw data, make drawings if necessary, attach printer output/photos, etc. Be sure to label the data so that you can understand it at a later date. Record all observations that you think might be significant. The notebook should include all the information needed to prepare a formal laboratory report.

1. Each notebook must have an accurate, up-to-date table of contents, at the beginning of the notebook.
2. Each entry must have a title, a date, and a statement of purpose or intent.
3. Each entry must end with a conclusion and/or statement of what must be done next.
4. Make entries at the time the work is performed. Do not write notes on scratch paper and make entries in your notebook later.
5. Make neat legible entries in blue or black ink. No Pencil.
6. Use the pages in consecutive order. Do not leave any blank pages, or room for data or data analysis to be added later. All entries should be chronological at the time the data or analysis are completed. You may add a note at the end of one entry referring to the page of the data or the analysis if there is intervening material.
7. For computer-generated records, photographs, or hand-drawn graphs, tape the material
into your notebook. Make reference to the printout on the page. If it is necessary to put such inserts into the notebook, mount them so that they do not cover written information.

8. If data or samples from another source are entered, be sure to indicate the source clearly, including the name of the person from which they were obtained.
9. Record all steps in sufficient detail so that any person skilled in the field would be able to repeat the work and obtain the indicated results.
10. A protocol that is used for the first time must be written out in full. If it is a standard protocol that you use on subsequent occasions, you may simply reference the first citing subsequently giving only modifications or experimental details (e.g. particular strains, enzymes, etc.)
11. Use only standard abbreviations
12. Record the name of all group members in your lab notebook.

**Lab Reports:**

There is no minimum/maximum number of pages. Lab reports are due and must be submitted in class on the dates in the lab schedule. Late lab reports will be penalized 15% for every day they are late.

- Reports must be typed, single-spaced, 12 pt Times New Roman font. All lab reports must adhere to the format in “Writing lab reports for biology” posted on blackboard.

**General:**

A few words about common courtesy: 1. BE ON TIME. 2. Cell phones, pagers, and personal music players are NOT allowed in the classroom or laboratory. 3. If you are having any problems throughout the semester do NOT wait to tell me.

**Academic Integrity:**

Academic Integrity is the practice of honesty and openness in scholarly, creative, and communal endeavors. Academic integrity is multifaceted. It involves, in addition to ethical practices, the avoidance of plagiarism, cheating and other forms of professional and personal misrepresentation and dishonesty.

Plagiarism and cheating are serious violations of academic integrity that have significant consequences for the student. Students caught cheating/plagiarizing will receive a zero for the exam/assignment and the program coordinator will be notified of the infraction. I have a zero tolerance policy for acts of cheating or plagiarism.

**Plagiarism:**

Plagiarism is the use or presentation of ideas, words, or work that is not one’s own and that is not common knowledge, without granting credit to the originator. Plagiarism may take many forms. To avoid plagiarism, always cite the source of your information whether from print, electronic/online, or other materials. It is incumbent upon the student to learn and understand what plagiarism is and how to avoid it.
Cheating includes:
1. Falsification of statements or data.
2. Listing of sources that have not actually been used
3. Having another individual write a paper or create work in lieu of one’s own; writing a paper or creating a work for another to use without attribution.
4. Purchase of a written paper of work for the purpose of submitting it as one’s own, or selling a written paper or other work for another’s submission as his/her own.
5. Using written, verbal, electronic, or other sources of aid during an examination, or knowingly providing such assistance to another.
### SCHEDULE

<table>
<thead>
<tr>
<th>Week #</th>
<th>Date</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1</td>
<td>9/6/17</td>
<td>Introduction to Lab. Lab safety. Microscopy. Determining Quick-Plant Genetics module I (Planting Irradiated Seeds)</td>
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<td>2</td>
<td>9/13/17</td>
<td>Karyotyping</td>
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<td>3</td>
<td>9/20/17</td>
<td>Population Genetics: Chromatography of <em>Drosophila</em> eye pigments.</td>
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<td>4</td>
<td>9/27/17</td>
<td>- Mendelian Genetics, probability and statistics</td>
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<td>- Bioinformatics I: Introduction</td>
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<td><strong>Lab Report #1 due: Chromatography of <em>Drosophila</em> eye pigments.</strong></td>
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<td>5</td>
<td>10/4/17</td>
<td>Fingerprints and Polygenic Inheritance</td>
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<td>- PTC Testing</td>
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<td>- Bioinformatics II: Creating a homology model and Docking analysis</td>
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<td>6</td>
<td>10/11/17</td>
<td><strong>Midterm</strong></td>
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<td>Hand in lab books for mid-semester checking</td>
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<td>7</td>
<td>10/18/17</td>
<td>Isolation of E. coli Chromosomal DNA; Gel Electrophoresis</td>
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<td>Fall Break (no Tuesday class)</td>
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<td>8</td>
<td>10/25/17</td>
<td>Usage of Restriction Enzymes in DNA finger printing Analysis (225)</td>
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<td><strong>Lab Report #2 due: Isolation of E. coli Chromosomal DNA</strong></td>
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<td>9</td>
<td>11/1/17</td>
<td>Determining Quick-Plant Genetics Using PCR module II, (336)</td>
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<td>10</td>
<td>11/8/17</td>
<td>Determining Quick-Plant Genetics Using PCR module III and IV (336)</td>
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<td>11</td>
<td>11/15/17</td>
<td>DNA Damage and Repair</td>
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<td><strong>Lab Report #3 due: Determining Quick-Plant Genetics</strong></td>
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<td>12</td>
<td>11/18/17</td>
<td>PCR – based ID of Genetically Modified Foods and Plants I</td>
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<td>13</td>
<td>11/29/17</td>
<td>PCR-based ID of Genetically Modified Foods and Plants II</td>
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<td>- Bioinformatics III DNA Informatics</td>
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<td>- Complete Labs, Review</td>
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<td>14</td>
<td>12/6/17</td>
<td><strong>Lab Final Exam</strong></td>
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<td>Laboratory notebooks are due for grading.</td>
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<td><strong>Laboratory report #4 due: Genetically Modified Foods and Plants</strong></td>
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