BMS 3114: GENETICS LAB

Contact: Professor Alexandra Seidenstein
Office Hours: Monday noon -2 PM or By appointment Rogers Hall 709
ahs342@nyu.edu  (aseidensteinI@icloud.com)

This course provides practical application of the techniques used to study genetic phenomena in prokaryotes, eukaryotes and viruses. The emphasis is on Mendelian and molecular approaches to genetic research. In addition, the course will provide an introduction to bioinformatic research techniques as well as recombinant technologies.

Learning Outcome:
After completing this course, you should be able to:

- Demonstrate the ability to use scientific method to design experiments and research background data.
- Understand the basic concepts of genetic structure and function, and how this applies to research and pathology
- Understanding of library research.
- Understanding of how genetic inquiry has driven medical research
- Understanding of molecular genetic mechanisms
- Understanding of biohazards
- Understanding of genetic and molecular laboratory techniques.
- Become familiar with techniques and practical application of Mendelian genetics, including statistical analysis of experimental results.
- Become familiar with the application 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.

Policies:

- Lab Protocol
  - Students are required to attend and 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. More than 15 minutes after the schedules start time counts as a lateness. Two lateness = 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 both the instructor and teaching assistant. Based on several factors including but not limited to: Preparedness, lab technique, neatness, teamwork, organization and experimental results

- 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 is the word-for-word reproduction of another writer’s work or ideas; paraphrasing without proper attribution also constitutes plagiarism. Neither will be tolerated in this class. Please see the discussion of plagiarism in the Student Guide of Academic Integrity (http://core.ls.nyu.edu/page/ls.academicintegrity) for more detailed information. Penalties for plagiarism range from a failing grade for a paper or a course to dismissal from the University.

The penalty for plagiarism in this class is a failing grade.

**Students with Disabilities:**
- Students with disabilities who believe that they may need accommodations in this class are encouraged to contact the Moses Center for Students with Disabilities at (212) 998-4980 as soon as possible to better ensure that such accommodations are implemented in a timely fashion. For more information, see the CSD website: http://www.nyu.edu/life/safety-health-wellness/students-with-disabilities.html

**Moses Students:**
- Members of Student Services must meet with me within the first 2 classes so arrangements can be made. Any students that fail to identify may not be considered for consideration.

Communication: by e-mail ahs342@nyu.edu / State full name, ID# and full course # in all correspondences.

Final Exam schedules are set by the University and therefore I do not have control over this.
- Please DO NOT assume that the exam will be before the last possible day of the final exam schedule.
- Please DO NOT schedule any personal events before the last possible day of the final exam schedule.
- If you miss the final exam and have carried a passing grade, you WILL receive a grade of an INCOMPLETE until the final is taken.

**Course Prerequisites:** Biology 1 and 2; General Chemistry, Organic Chemistry

**Course Textbook:** GENETICS: Analysis and Principles, 5th edition, Robert J. Booker

**Grading:** 60% Lecture + 40% of Lab Grade

**Lab Grade:**
- **Midterm:** 20% - Given during class on the date listed on the syllabus
- **Cumulative Final Exam:** 30% - Given on the last day of class
- **Four Lab Reports:** 25%
- **Lab Technique:** 10%
- **Notebook and Quizzes:** 15%
**Lab 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. 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.
  - Each notebook much have an accurate, up-to-date table of contents in the beginning.
  - Each entry must have a title, a date, and a statement of purpose or intent.
  - Each entry must end with a conclusion and/or statement of what must be done next.
  - Make entries at the time the work is performed. Do not write notes on scratch paper.
  - Make neat legible entries in blue or black ink. No Pencil.
  - 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.
  - For computer-generated records, photographs, or hand-drawn graphs, tape the material into your notebook. Make reference to the printout on the page.
  - 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.
  - Record all steps in detail so that a skilled person would be able to repeat the work.
  - 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.)
  - Use only standard abbreviations.
  - 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.
- Lab Reports may be “re-done” for a maximum of 80% within one week.
- All lab reports must adhere to the format in “Writing lab reports for biology” posted on NYU-Classes.
<table>
<thead>
<tr>
<th>Week #</th>
<th>Date</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1</td>
<td>09/05/17</td>
<td>Introduction to Lab. Lab safety. Microscopy. Determining Quick-Plant</td>
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<td>Genetics module I (Planting Irradiated Seeds), Meiosis/Mitosis</td>
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<td>2</td>
<td>9/11/17</td>
<td>Karyotyping/Chromosome Walk</td>
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<td>4</td>
<td>9/25/17</td>
<td>Mendelian Genetics, probability and statistics</td>
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<td>Bioinformatics I: Introduction</td>
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<td><em>Lab Report #1 due: Chromatography of Drosophila eye pigments.</em></td>
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<td>5</td>
<td>10/02/17</td>
<td>Fingerprints and Polygenic Inheritance /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>10/09/17</td>
<td>Midterm</td>
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<td>Hand in lab books for mid-semester checking</td>
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<td>7</td>
<td>10/16/17</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>10/23/17</td>
<td>Usage of Restriction Enzymes in DNA finger printing Analysis (225)</td>
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<td><em>Lab Report #2 due: Isolation of E. coli Chromosomal DNA</em></td>
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<td>9</td>
<td>10/30/17</td>
<td>Determining Quick-Plant Genetics Using PCR module II, (336)</td>
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<td>10</td>
<td>11/06/17</td>
<td>Determining Quick-Plant Genetics Using PCR module III and IV (336)</td>
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<td>11</td>
<td>11/13/17</td>
<td>DNA Damage and Repair</td>
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<td><em>Lab Report #3 due: Determining Quick-Plant Genetics</em></td>
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<td>12</td>
<td>11/20/17</td>
<td>PCR – based ID of Genetically Modified Foods and Plants I (no class</td>
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<td>11/23/16)</td>
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<td>13</td>
<td>11/27/17</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>12/04/17</td>
<td>Finish Labs – due to missed classes</td>
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<td>15</td>
<td>12/11/17</td>
<td>Lab Final Exam</td>
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<td>Laboratory notebooks are due for grading.</td>
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<td><em>Laboratory report #4 due: Genetically Modified Foods and Plants</em></td>
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