

BIO 211L: Genes, Molecules and Cells Lab

Spring 2025

Instructor: Noelle J. Relles

Lab: Wed. & Thurs. 1:00-4:00 pm – SCCT 2089

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Office Hours: Mondays 1:30-3:00

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Thursdays 10:00-11:30

Required: Lab notebook

Course Description:

An intermediate course that examines genetics and biochemistry within the context of the cell. This course will focus on the macromolecules of life, genetic material and classical genetics, fundamental biochemical pathways, and cellular structure and function. A particular focus will be placed on proteins and nucleic acids and how cells use these molecules to direct the mechanisms of inheritance, energy production, and cellular reproduction. In lab, we will learn and practice the tools and techniques used to study molecules, cells, and genetics. In the lab we will look at:

- 1) Macromolecules: the building-blocks of cells
- 2) The function of enzymes
- 3) Bacterial transformation
- 4) Protein quantitation
- 5) Antigen vs. PCR testing for the Covid-19 virus
- 6) PTC Tasting-The Genetics of Bitter Taste

Goals:

The lab section of BIO211L is designed to help you connect concepts and content from class with the actual practice of laboratory research related to the study of genes, molecules, and cells. A true comprehension of life at the cellular level requires understanding the experimental process and practice of genes, molecules and cells. In lab you will learn the techniques, tools and skills to study genes, molecules, and cells, a foundation for upper-level biology labs at Hamilton. We will emphasize two of the eight education and curriculum goals laid out by Hamilton College (www.hamilton.edu/academics/catalogue/educational-goals-and-curriculum):

- 1) *Analytic Discernment:* We will analyze quantitative and symbolic information to identify patterns and connections and understand foundational concepts in the study of molecular and cellular biology and genetics.
- 2) *Disciplinary Practice:* We will learn the tools, techniques and methodologies of for studying genetics, molecular and cellular biology. You will have the opportunity to master basic lab skills as well as learn cutting-edge techniques used in current scientific research.

Attendance:

Attendance is required to all lab sections. If you need to miss class, please come speak to me in advance about how to make up the lab. Please note that the free pass cannot be used to miss a lab; all labs must be made up if absence is unavoidable. Unexcused absence from lab will result in a lower grade.

Grades:

The lab will count for 30% of your total BIO211 grade. The lab grade will be assessed based on attendance and participation, lab notebooks, assignments and lab reports.

Lab Notebooks:

You must maintain a lab notebook as a record of your activities in BIO211, and they will be checked for completeness each week. You should read all pre-lab material and prepare your lab notebook in advance of lab (Objectives and Procedures sections) as well as record results and discussions after lab. Notebooks will be checked at the beginning of each lab. We will discuss how to keep a lab notebook in the first lab section meeting. Lab notebooks should be an accurate record of the work you performed, why the work was performed, the results and a discussion of what the results mean. Lab notebooks should be written in a **legible** manner that would allow someone other than yourself to understand and replicate what you did. Another good rule of thumb for lab notebooks is that you should be able to pick it up 5 years from now and understand what you did, why, and what you found.

Lab Assignments:

There will be a variety of assignments in the lab. As outlined above, maintaining a lab notebook will be a major assignment in this course, and all notebooks will be checked at the beginning of class. In addition to notebooks, there will be pre- and post-lab questions and lab reports. Post-lab questions will help make sure you understand the material before the lab report is due.

Lateness policy:

All lab assignments: pre-lab notebook recordings, post-lab questions, and lab reports must be turned in on time. Assignments turned in late will receive one letter grade reduction per 24 hours late. You can use your “free pass” on any lab assignment including notebooks and have an additional 48 hours to complete the assignment. Please note: **there is only one free pass total** for the semester. The free pass cannot be used to miss a lab; all labs must be made up if absence is unavoidable. Beyond the free pass, I understand that difficult life events occur, so please come speak to me if you are struggling to meet deadlines. We will work together to address the late work.

Honor Code:

- Students are expected to adhere to the Hamilton Honor Code: <https://www.hamilton.edu/student-handbook/studentconduct/honor-code>
- Students are encouraged to discuss protocols and share resources, but all written lab work/lab notebooks must be done independently and are subject to the Hamilton College Honor Code.
- AI is a growing technology that has the potential to be a helpful assistant for studying and editing but can also cause issues with plagiarism and can return misleading or incorrect content depending on the prompt given. I caution you to rely too heavily on AI for help with studying if you are still learning how to properly input prompts and check the results. I consider work generated using AI and submitted as your own to be plagiarism and it will be treated as such.

Accommodating Persons with Disabilities

- Hamilton College will make reasonable accommodations for students with properly documented disabilities. If you are eligible to receive an accommodation(s) and would like to make a formal request for this course, please discuss it with me as soon as possible. You will need to provide Allen

Harrison, Assistant Dean for Accessibility Resources (aharriso@hamilton.edu) with appropriate documentation of your disability.

- I request that any student with a documented disability needing academic adjustments or accommodations speak with me as soon as possible. All discussions will remain private/confidential. Students with disabilities should also contact Allen Harrison, Assistant Dean for Accessibility Resources (aharriso@hamilton.edu) who coordinates services for students with disabilities.
- Any student who feels that he or she may need an accommodation because of a disability (learning, attention deficit disorder, psychological, physical, etc.) please make an appointment to see me as soon as possible during my office hours.*

Emergency Preparedness:

In the event of an extended disruption of normal classroom activities, the format for this course may be modified to enable its completion within its programmed time. In the event of an evacuation order during class, we will evacuate to the main quad in front of SCCT and await further directions. In the event of a shelter-in-place order during class, we will stay in class until the order is called off. In the event that a shelter-in-place order is in effect when class starts, class will be cancelled for the day.

There are times that each of us may feel overwhelmed, anxious, or depressed. There are many resources available on campus to help and support you:

- Counseling Center (www.hamilton.edu/offices/counselingcenter, 315-859-4340) offers individual and group therapy, peer counselors and psychiatric treatment. If you need immediate assistance, phoning the Counseling Center and selecting option 2 will connect you with a counselor, 24 hours a day, 7 days a week.
- Associate Dean of Students for Student Support, Sarah Solomon (315-859-4463; ssolomon@hamilton.edu)
- Associate Dean of Students for Academics, Adam Van Wynsberghe (315-859-4600; avanwyns@hamilton.edu)
- Your faculty advisor
- Your Community Advisor and Area Director in your residence hall

If at any time you feel suicidal or in danger of harming yourself or others, please reach out for support! The Hamilton community cares and is available to help. Campus Safety is available 24/7 for urgent concerns at 315-859-4000.

Schedule:

Below is a lab schedule of topics. You will have pre-lab reading each week and be expected to complete a short pre-lab assignment on Blackboard to show you've completed the pre-lab reading. Lab notebooks will be checked each week for pre-lab entries for the current week (including an objective statement and protocol) and post-lab entries (results, including graphs and figures, and discussion) from the previous week. Larger assignments will be given specific due dates, which will be posted on Blackboard.

Week	Date	Lab Topic	Lab Notebook
1	1/22 & 1/23	Introduction; Lab Safety and Lab notebooks; Concentration/volume equations	
2	1/29 & 1/30	Experimental Design & Data Management; Testing for Biological Macromolecules	Write out lab protocol in lab notebooks in detail! Pre-lab "quiz" on Blackboard to complete before coming to lab.
3	2/5 & 2/6	Scientific literature-navigating library resources and using Refworks; Enzymes	Write out milk experimental protocol in lab notebooks and be prepared to hand in; Write out lab protocol; Pre-lab "quiz" on BB before coming to lab; Bring laptops to lab.
4	2/12 & 2/13	Bacterial transformation w/ pGLO plasmid; Run "milk" experiment	Enzymes post-lab due; Write out lab protocol; Pre-lab "quiz" on BB before coming to lab and answer post-lab questions on BB after lab
5	2/19 & 2/20	Poster prep. presentation; Inoculate bacterial colonies; grow overnight in shaking water bath	Write out lab protocol; Answer post-lab questions on BB after lab. Milk lab report due by Sunday 2/23 11:59 pm;
6	2/26 & 2/27	Purify GFP & quantify	Write out lab protocol; Pre-lab "quiz" on BB.
7	3/5 & 3/6	Bioinformatics part I	GFP quantification due; Pre-lab "quiz" on BB before coming to lab; Bring laptops to lab.
	3/12 & 3/13	Buffer week	
	3/19 & 3/20	SPRING BREAK	
8	3/26 & 3/27	SPRING BREAK	
9	4/2 & 4/3	Covid testing week 1: PCR and ELISA	Write out lab protocol; Pre-lab "quiz" on BB before coming to lab.
10	4/9 & 4/10	Covid testing week 2: Gel Electrophoresis; Bioinformatics part II	Pre-lab "quiz" on BB before coming to lab; Bring laptops to lab.
11	4/16 & 4/17	PTC week 1: (DNA extraction & PCR)	Covid 19 lab report due by Sunday 4/20 11:59 pm; Write out lab protocol; Pre-lab "quiz" on BB before coming to lab.
12	4/23 & 4/24	PTC week 2: Gel Electrophoresis	Write out lab protocol; Pre-lab "quiz" on BB before coming to lab.
13	4/30 & 5/1	PTC week 3: Pedigree and population genetics	Write out lab protocol; Pre-lab "quiz" on BB before coming to lab.
14	5/7 & 5/8	Poster session	PTC Final Post-lab due by 5/9 11:59 pm