

Molecular Biology Laboratory
UN3040 – Fall 2023

Welcome to Molecular Biology Lab!

Instructor:

Dr. Joshua Abrams (jma2278@columbia.edu)

Office hour: TBD, 922 Schermerhorn Hall

Day	Time & Location
Monday	2:40PM – 3:55PM, 900 Fairchild
Wednesday	1:10PM – 5:00PM, 743 Mudd

Teaching Assistant

Name	Email
Jerson Estrella	jde2146@columbia.edu

Pre-requisites

UN2005/UN2401 and UN2006/UN2402, or the equivalent at a different institution, and Contemporary Biology Laboratory (UN2501).

Course description

This laboratory course will explore fundamental techniques that are frequently utilized in modern molecular biology laboratories. A combination of experiments will provide broad exposure to several important techniques in molecular biology. Experiments include current approaches to DNA barcoding, cloning by PCR, analysis of GFP mutations, and protein analysis. Students will pursue multiple experimental projects and will gain experience with scientific thinking and scientific communication.

Assigned Readings

Required: Class protocols & handouts will be posted on CourseWorks throughout the semester

Assignments and Grading

Restriction Digest Lab & Write up – 15%

Fish DNA & Bioinformatics Project – 25%

Fish Protein Project – 25%

pGLO/GFP Project – 25%

Protocols, Homework & Participation – 10%

Course Structure

Protocols - Before beginning each experiment you will be required to write up detailed protocols with explanations regarding the logic of important steps. We will provide protocols that are fairly thorough but do not consider the specifics of our lab equipment or reagent concentrations. For example, our gel apparatus holds a specific volume of TBE that will need to be known before adding Ethidium Bromide. When preparing a protocol, you will need to include the following:

- Summarize in a few sentences what you plan to do for the experiment and why
- State what needs to be done first before starting the experiment (e.g. set incubator, defrost solutions, obtain ice, etc.)
- Calculate how to make any solutions needed for the experiment
- Turn in an initial writeup on Monday to get feedback. Make any needed changes for Wednesday. Note any additional changes that you make on the day of the experiment. This will enable you to repeat your work, if necessary. You should clearly record your specific methods for each experiment with sufficient detail that another person could repeat the experiment.

Lab Work – Feel free to open drawers and cabinets to find items around the lab. The work area must be clear at the end of the day. Please store in the drawers, cabinets, refrigerator or freezer any items specific to our lab, return racks to their place and discard any waste into the proper receptacle. Vials kept in the 4C or -20C must be in labeled boxes, not racks. Be sure to sign up for any equipment you will use that isn't specifically during our lab hours including shakers, PCR machines, and incubators.

There will be a few times when you will need to come in outside of the class period to set things up. If you can't come in on a certain day, please coordinate with your lab partner or individuals in another group. Try to make it for as many of these out of class time activities so that you can see all parts of the protocol. Everyone is expected to spend additional time reading, preparing protocols and writing up assignments.

Group Collaboration - Each group will share reagents and experiments. However, each student will write up their own protocol and must be able to explain any part of the experiment. Each student will write all of their assignments independently. We understand that since your assignments are frequently based on the same experiments and results, that reports from the same groups will be similar. However, each student must write their own paper and work independently with respect to the writing portion of the assignment.

Students are expected to complete all assignments within the deadlines. If a legitimate reason prevents you from completing an assignment on time, notify the instructor and TA ASAP.

For all Lab Reports and homework assignments, students are responsible for uploading their completed documents onto CourseWorks. It is the student's responsibility to check that their submitted files have been filled out and uploaded correctly in CourseWorks, and files uploaded past the assignment deadline will be considered late.

Points will be deducted for late or missing work: there will be a 5% deduction the first day, and a 1% deduction each subsequent day until turned in. The last day to turn in any assignment will be the last day of final exams, 12/22/23.

Questions about all graded assignments need to be asked within one week of receiving the graded item back (homework questions, lab report, etc.). Any re-grade requests must be brought to the attention of the instructor. Questions after one week will not be considered for grade adjustment.

Attendance and Participation

We expect a climate of mutual respect and full participation. Attendance and participation in every lab are mandatory for all students. Additional time outside of the scheduled class periods is required to prepare for and complete the experiments in this course. In general, this equates to approximately 12 hours/week.

If you must miss a lab meeting, let your instructor and TA know in advance, and plan to work with your lab partner during the week to make up for the absence. *Absence from 3 lab meetings will result in a failing grade.*

Office Hours

Instructor and Teaching Assistant will hold regular office hours. The schedule will be posted on CourseWorks shortly after the semester begins.

Tentative Course Schedule

Below is an outline of the tentative course schedule for the Fall 2023 semester.

****Note: The schedule may be (and often is) subject to change throughout the semester, depending on class progression and grasp of subject matter and techniques.*

Exact due dates will be noted on assignments when they are posted

Week	Date	Topic	Assignments	Reading
1	9/4-9/8	<u>Wed</u> : course overview, lab setup, pipetting activity		Restriction Enzymes & Electrophoresis
2	9/11-9/15	<u>Mon</u> : Running & Interpreting gels <u>Wed</u> : Restriction digest & run gel	-Restr Digest protocol due -Dilutions homework due	Fish DNA Barcoding manual
3	9/18-9/22	<u>Mon</u> : <i>no meeting</i> , submit protocol for review <u>Wed</u> : Fish DNA Barcoding I	- Get fish for barcoding expt - Gel homework & DNA Barcoding I protocol due	Fish DNA Barcoding manual
4	9/25-9/29	<u>Mon</u> : PCR discussion <u>Wed</u> : Fish DNA Barcoding II	-Restr Digest write up due -DNA Barcoding II protocol due	Cloning & Ligation manual
5	10/2-10/6	<u>Mon</u> : cloning discussion <u>Wed</u> : Fish cloning I & bioinformatics I	-Fish cloning I protocol due	- Cloning & Ligation manual - Fish bioinformatics manual
6	10/9-10/13	<u>Mon</u> : bioinformatics discussion <u>Wed</u> : Fish cloning II & bioinformatics II	-Fish cloning II protocol due	- Cloning & Ligation manual - Fish bioinformatics manual
7	10/16-10/20	<u>Mon</u> : bioinformatics discussion <u>Wed</u> : Fish cloning III & bioinformatics III	-Fish cloning III protocol due	Fish protein manual
8	10/23-10/27	<u>Mon</u> : Protein discussion <u>Wed</u> : Fish Protein Lab I & check cloning seq	-add coomassie stain outside of class and leave o/n, then destain gel and leave o/n -Protein lab I protocol due	Fish protein manual
9	10/30-11/3	<u>Mon</u> : Protein discussion <u>Wed</u> : Fish Protein Lab II	-Fish Bioinformatics Lab Report Due -Protein lab II protocol due	pGLO/GFP & SDM Manual
10	11/6-11/10	<u>Mon</u> : <i>NO CLASS (holiday)</i> <u>Wed</u> : pGLO/GFP Lab I	-pGLO/GFP lab I protocol due	pGLO/GFP & SDM Manual

11	11/13-11/17	<u>Mon:</u> GFP & SDM discussion <u>Wed:</u> pGLO/GFP Lab II	-Fish Protein Lab Report Due -pGLO/GFP lab II protocol due	pGLO/GFP & SDM Manual
12	11/20-11/24	<u>Mon:</u> GFP & SDM discussion <u>Wed:</u> <i>Thanksgiving Break (no lab)</i>		GFP Chromatography Manual
13	11/27-12/1	<u>Mon:</u> Chromatography discussion <u>Wed:</u> GFP Protein Chromatography	-Chromatography protocol due	Proteomics Manual
14	12/4-12/8	<u>Mon:</u> Proteomics Discussion <u>Wed:</u> Proteomics Lab		
15	12/11-12/15	<u>Mon:</u> protein/proteomics discussion, final class wrap up <u>Tue-Thu:</u> study days	pGLO/GFP Lab Report Due	

Email Communication

The University expects that every student will receive email at his or her Columbia University email address and will read email on a frequent and consistent basis. A student's failure to receive and read University communications in a timely manner does not absolve that student from knowing and complying with the content of such communications. For more information, please refer to the link below.

<https://universitypolicies.columbia.edu/content/student-email-communication-policy>

Columbia College Honor Code

All UN3040 students are expected to conduct themselves in full accordance with the Columbia College Honor Code, cited below. Violations of the Honor Code will result in disciplinary processes that will depend on the nature of the violation. Students will be required to reaffirm their adherence to the code, either electronically or in written form, for all work, exams, or assignments they submit to the instructor or TA:

The Columbia College Student Council, on behalf of the whole student body, has resolved that maintaining academic integrity is the preserve of all members of our intellectual community – including and especially students.

As a consequence, all Columbia College students will now make the following pledge:

We, the undergraduate students of Columbia University, hereby pledge to value the integrity of our ideas and the ideas of others by honestly presenting our work, respecting authorship, and striving not simply for answers but for understanding in the

pursuit of our common scholastic goals. In this way, we seek to build an academic community governed by our collective efforts, diligence, and Code of Honor.

In addition, all Columbia College students are committed to the following honor code:

I affirm that I will not plagiarize, use unauthorized materials, or give or receive illegitimate help on assignments, papers, or examinations. I will also uphold equity and honesty in the evaluation of my work and the work of others. I do so to sustain a community built around this Code of Honor.

Faculty Statement on Academic Integrity

Together with the Honor Code, the Faculty Statement on Academic Integrity, cited below, further defines the standards expected of all members of our intellectual community:

The intellectual venture in which we are all engaged requires of faculty and students alike the highest level of personal and academic integrity. As members of an academic community, each one of us bears the responsibility to participate in scholarly discourse and research in a manner characterized by intellectual honesty and scholarly integrity.

Scholarship, by its very nature, is an iterative process, with ideas and insights building one upon the other. Collaborative scholarship requires the study of other scholars' work, the free discussion of such work, and the explicit acknowledgement of those ideas in any work that inform our own. This exchange of ideas relies upon a mutual trust that sources, opinions, facts, and insights will be properly noted and carefully credited.

In practical terms, this means that, as students, you must be responsible for the full citations of others' ideas in all of your research papers and projects; you must be scrupulously honest when taking your examinations; you must always submit your own work and not that of another student, scholar, or internet agent.

Any breach of this intellectual responsibility is a breach of faith with the rest of our academic community. It undermines our shared intellectual culture, and it cannot be tolerated. Students failing to meet these responsibilities should anticipate being asked to leave Columbia.

Disability Services

To receive disability-related academic accommodations for UN3040, students must first be registered with their school Disability Services (DS) office. Detailed information is available online for both the Columbia and Barnard registration processes. Refer to the appropriate website for information regarding deadlines, disability documentation requirements, and drop-in hours (Columbia)/intake session (Barnard).

For this course, students registered with the Columbia DS office can refer to the “Courses that do not require professor signature” section of the DS Testing Accommodations page for more information about accessing their accommodations.