

Contemporary Biology Laboratory
UN2501 – Fall 2023
922 Schermerhorn Hall

Welcome to the Contemporary Biology Lab!

Dr. Joshua Abrams (jma2278@columbia.edu)

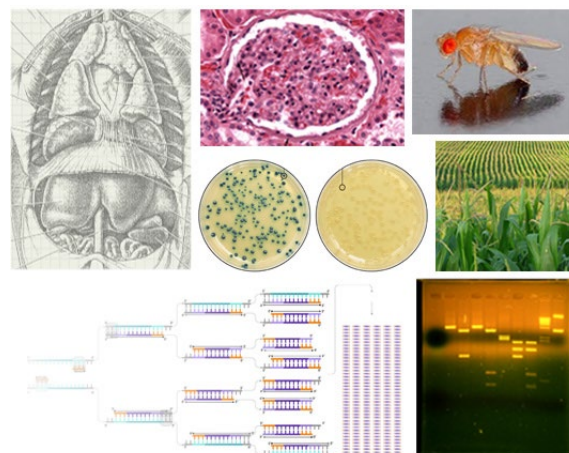
Office hour: TBD

922 Schermerhorn Hall

Dr. Ava Brent (aeb28@columbia.edu)

Office hour: Tuesdays, 11-12pm or by appointment

922 Schermerhorn Hall



Section	Day	Time
001	Monday	1:10PM – 5:00PM
002	Tuesday	1:10PM – 5:00PM
003	Wednesday	1:10PM – 5:00PM
004	Thursday	5:40PM – 9:30PM
005	Friday	1:10PM – 5:00PM

Teaching Assistants

Name	Email	Section
Kate Eickhoff	kce2113@columbia.edu	Monday
Lamiya Rahman	lr2983@columbia.edu	
Claire Earl	cme2153@columbia.edu	Tuesday
Julia Cappell	jsc2269@columbia.edu	
Helen Gillespie	hmg2158@columbia.edu	Wednesday
Melody Lu	mjl2253@columbia.edu	
Kathan Reddy	kvr2112@columbia.edu	Thursday
Alptug Kaynar	ahk2181@columbia.edu	
Dean Babb	dmb2274@columbia.edu	Friday
Lina Yamahara	ly2473@columbia.edu	

Pre-requisites or co-requisites

BIOL UN2005 or BIOL UN2401.

Course description

UN2501 is divided into two parts: In the first half of the semester, you will learn how to dissect and identify the comprehensive anatomical structures of the fetal pig.

Histological samples will be examined to inform physiology and pathology. In the second half of the term, you will study experimental approaches to molecular biology and genetics.

Assigned Readings

Required:

Class handouts posted on CourseWorks

Additional Materials:

- 1) Walker and Homberger. (1998). Anatomy & Dissection of the Fetal Pig. 5th Edition.
Available on CourseWorks as a PDF
- 2) Smith and Schenk. (2011). Dissection Guide & Atlas to the Fetal Pig. 3rd Edition.
Available on CourseWorks as a PDF

Assignments and Grading

Pre Lab quizzes –10%

Post Lab questions – 30%

Midterm Practical Exam – 25%

Final Lab Report – 25%

Attendance and Participation – 10%

- 1) Pre Lab Quizzes: A multiple-choice quiz will be released on CourseWorks each Friday. Questions will be based on the assigned reading/protocol associated with the lab for the following week. Each quiz must be completed before the class period the following week to receive credit.
- 2) Post Lab Questions: Short-answer questions covering background information, lab protocol, data analysis, and problem-solving/applications/case studies. Post lab questions are designed to assess your understanding of each lab's focus, and your ability to apply theoretical concepts to lab manipulations and analyses. These

assignments will help familiarize you with lab report organization and protocol, in preparation for the final lab report you will produce at the end of the term.

You can work together to answer the post lab questions, but each student must turn in their own assignments, written in their own words.

All assignments will be available through the “Assignments” section of CourseWorks.

- 3) Midterm Practical Exam: An in-class practical covering material from the first half of the course (fetal pig anatomy, physiology, and histology). Format will include structure identification as well as questions on function and pathology.
- 4) Final Lab Report: Formal report for Lab 2 (GMO). Guidance on writing your lab report and grading rubric will be posted later in the semester.

Note that several assignments will be due at the end of the semester, but the assignments will be posted early enough for you to begin working on them earlier. Budget your time!

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

For all Post Lab Questions and the Final Lab Report, 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. Documents that are missing pages or that have not been filled out correctly will be graded in the condition that they are received, 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 (post lab 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.

Please sign in on the attendance sheet when you arrive at class.

If you must miss a lab, let your instructor and TAs know in advance, and plan to attend a different lab section during the same week to make up for the absence. Make-up labs are especially important in the second half of the course, as data from experiments will be needed for post lab questions and the final lab report. *Absence from two or more labs will result in a failing grade.*

Office Hours

Teaching Assistants will hold weekly office hours in the regular Biology Lab - 922 Schermerhorn. The schedule will be posted on CourseWorks once 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 reagent availability.*

Exact due dates will be noted on assignments

Week	Date	Topic	Assignments	Reading
1	Sept 5 – 8	Visit classroom, select lab coat		Review syllabus
2	Sept 11 – 15	Dissection I: Fetal pig: Introduction, External Anatomy, Digestive System, Thoracic Cavity		Dissection reading I
3	Sept 18 – 22	Dissection II: Circulatory System, Cow heart, Uterus	Quiz 1	Dissection reading II
4	Sept 25 – 29	Dissection III: Respiratory System, Urogenital System - Male and Female; Adult Kidney, Cow Eye	Dissection Post Lab Due Quiz 2	Dissection reading III
5	Oct 2 – 6	Histology I	Quiz 3	Histology reading
6	Oct 9 – 13	Histology II, Practice Practical/Review	Quiz 4	
7	Oct 16 – 20	Practical Exam: Anatomy & Histology		
8	Oct 23 – 27	Lab 1: Restriction mapping	Quiz 5	Lab 1 Protocol
9	Oct 30 - Nov 3	Lab 2: GMO I Lab 3: <i>Drosophila</i> I	Restriction Enzyme Post Lab Due Quiz 6	Lab 2 Protocol Lab 3 Protocol
10	Nov 6 – 10	M-Tu NO CLASS		
		W-F Lab 2: GMO II Lab 3: <i>Drosophila</i> II	Quiz 7	Lab 2 Protocol Lab 3 Protocol
11	Nov 13 – 17	M-Tu Lab 2: GMO II Lab 3: <i>Drosophila</i> III	Quiz 7	Lab 2 Protocol Lab 3 Protocol
		W-F <i>Drosophila</i> III Lab 4: CRISPR I	GMO Post Lab Due Quiz 8	Lab 3 Protocol Lab 4 Protocol
12	Nov 20 – 24	M-Tu Lab 3: <i>Drosophila</i> IV Lab 4: CRISPR I	GMO Post Lab Due Quiz 8	Lab 3 Protocol Lab 4 Protocol
		W-F NO CLASS		
13	Nov 27 – Dec 1	Lab 3: <i>Drosophila</i> V Lab 4: CRISPR II	<i>Drosophila</i> Post Lab Part I Due Quiz 9	Lab 3 Protocol Lab 4 Protocol

14	Dec 4 – 8	Lab 4: CRISPR III	<i>Drosophila</i> Post Lab Part II Due Quiz 10	Lab 4 Protocol
15	Dec 12 – 14	Study Days	CRISPR Post Lab Due (12/15)	
16	Dec 15 – 22	Final Exam Week	Final Lab Report Due (12/20)	

Course Structure

Part I will introduce you to the study of vertebrate anatomy, physiology, histology, and pathology, with a fetal pig as the model organism. Histology samples will be examined for microscopic tissue structure. A lab practical exam will be given, similar in structure to the kind of lab practical administered in a medical school setting.

Part II will comprise a set of experiments that apply classical and contemporary approaches to genetics and molecular biology. Emphasis will be placed on lab protocol, data collection, and analysis of resulting data. Post lab questions will guide you through your analyses, as well as introduce you to the process of assembling the sections required for a formal lab report. Your final assignment will be your formal lab report for Lab 2 (GMO).

PART I: Vertebrate Anatomy, Histology, and Pathology

Dissection of a Fetal Pig

Histology and Pathohistology

PART II: Experiments in Genetics and Molecular Biology

Lab 1: Restriction Enzyme Mapping

Students will “cut up” (digest) a circular plasmid, using restriction enzymes. The fragments will be separated by gel electrophoresis, and visualized with UV light. Students will then create a restriction enzyme map of the plasmid.

Lab 2: Identification of Genetically Modified Organisms (GMOs)

In Lab 2, students will use PCR and DNA electrophoresis to test for the presence of two GMO-associated DNA sequences that are found in >85% of GMO crops approved for distribution worldwide. Using a variety of food items (from a grocery store), students will extract and amplify the DNA from the samples via PCR, and perform agarose gel electrophoresis to identify presence or absence of amplified GMO sequences.

Lab 2 will be the subject of your final lab report.

Lab 3: Recombination Mapping in *Drosophila melanogaster*

In this multi-week experiment, four phenotypic traits will be examined via genetic crosses to determine chromosome linkage and dominance relationships between wild-type and mutant alleles. Students will generate a genetic, or recombination map, showing the order of genes and the distance between them.

Lab 4: CRISPR-Cas9 Gene Editing in *E coli*

In this lab, students will use CRISPR-Cas9 gene editing to inactivate the lacZ gene in *E coli*. Methods used in this lab will include bacterial transformation, plating on selective media, and bioinformatics analysis of CRISPR targets. Results will be visualized with blue-white screening and confirmed by multiplex PCR.

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 UN2501 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 UN2501, 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.