BIOS 1107 Lab: Biological Principles
Summer 2026 *Lab Syllabus & Schedule*

TAs: *To find your TAs, please see "People" on the lab Canvas site*
TAs' email addresses are also on the Canvas homepage

Faculty Instructor: Dr. Colin Harrison, colin.harrison@biosci.gatech.edu
Drop-In Hours: By appointment
Lab sections:

BIOS 1107 Laboratory: How it works

1. **Learning objectives:** The objective of BIOS 1107 Lab is to give you experience in how to carry out research in biology by researching the background of an experiment, designing an experiment, formulating a hypothesis, and then analyzing and interpreting data. You will learn how to explore the background of a research topic and ways in which biology connects to real world problems and issues. You will gain experience in scientific communication by creating and evaluating written lab reports and by giving research presentations. You will also get experience in working collaboratively with a group as you design your experiment. One of the core goals of this course is to highlight the diversity in Biology, both in the science itself as well as the people who do science. Throughout the lab we will discuss different ways in which Biology interacts with the diverse communities of Earth. The labs will also support the concepts you learn in the lecture portion of the class, however there is not complete overlap as some material will appear in lab at different times than in lecture.

2. **PPE:** You will need a lab coat and safety goggles which are also available via the University Bookstore.

3. **Safety in Lab:** While in lab all students will be required to wear all appropriate PPE. This includes goggles, lab coats, and gloves. We will also encourage you to wear masks while you are in lab. Students will be responsible for their own lab coats and goggles while Bio labs will supply gloves and disposable facemasks for in-lab use.

   Failure to bring the required PPE will result in denial of admission to labs with grade penalties for missing lab, no exceptions. In addition refusal to comply with proper PPE usage and distancing guidelines will result in grade reduction as well as potential disciplinary action for violating the Georgia Tech Honor Code.

4. **Drop-In Hours:** Dr. Harrison's drop-in hours are available on appointment, email if you want to set up a time to meet. Your TAs are available to meet with you separately as well**,** please email them to schedule time to meet.

5. **Absences:**
   - **a.** Please read below and make sure that you understand the policies and procedures. **In all cases where you will be absent, you must contact Dr. Harrison AND your TAs. You must complete a makeup assignment if you are unable to make it to lab.**
   - **b.** *For illness:* If you feel sick and/or exhibit any of the symptoms of COVID-19 (https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html) please

alert Dr. Harrison as soon as possible and cc your TAs on any email you send to him. It is your responsibility to let your lab group members know if you will be missing a session and adjust your schedule for attendance accordingly. Students will be allowed one excused absence for the semester and be required to make-up missed work/assignments.

a. *For other situations:* If you have to miss class for any other reason please contact Dr. Harrison AND your TAs via email as soon as possible. Students will be allowed one excused absence for the semester and be required to make-up missed work/assignments.

b. *Unexcused absences:* There are no make-up labs for unexcused absences. An unexcused lab results in a 10% reduction of your lab grade and loss of participation points for that lab. **Note**: **if you miss a lab you are still responsible for completing assignments and getting data from group members.**

c. *Excused absences:* If you miss lab, or know in advance that you will need to be excused from a lab, contact Dr. Harrison AND your TAs by the time your lab meets for the week (unless it is an emergency) to confirm your absence and get instructions on how to makeup the missed session. **There is no penalty for an excused absence but only 1 excused absence is permitted.**

6. **Group work in BIOS 1107 Lab:** Performing biological research is a collaborative process! Research scientists generally work with their fellow lab members, soliciting input on aspects of being a scientist such as the overall direction of research, design and performance of individual experiments, and scientific presentation skills. We will encourage that in this class by working in groups to design and carry out our experiments. This should lead to more innovative and creative ideas. Groups will be ~4 students. **Please be aware of what is and isn't appropriate group work in lab (read #8).**

7. **Plagiarism will not be tolerated**: Some of the work that you do in lab will be with members of your group. If you are concerned that something may constitute plagiarism, please see your TAs or Dr. Harrison. You are expected to collaborate on experimental design and are encouraged to discuss the meaning of your results. **All written work, however, must be on your own.** Lab reports are to be written individually and be your original work. If you include a non-original idea in your reports it must be cited. Figures and figure legends should be your own as well. Pre-lab assignments must be completed individually. Lab presentations should be done individually. Plagiarism will result in a grade of "0" for that assignment and referral to the office of student integrity which may result in additional consequences. Please familiarize yourself with the honor code (http://honor.gatech.edu/) and follow it. Assignments will be run through TurnItIn® software plug-in on Canvas.

8. **Use of AI:** Machine learning language processing and artificial intelligence are becoming common in the generation of text. These tools are sophisticated enough that they can now generate answers to some basic questions (which does not mean they are necessarily correct answers). The use of AI/ML-generated text is not allowed to generate your response to any assignment in this class. However, this AI tools can be useful in the process of editing and refining a written response. AI tools should be used as you would a trip to the writing center, where the AI or writing tutor can help provide outlines, feedback, and editing to a written response. If you utilize AI in your response, you should submit the input you provided the AI, cite the AI you used, and explain how it was utilized. Improper AI use will result in a zero on the assignment in question and a referral to the office of student integrity.

9. **Learning Accommodations (Office of Disability Services)**: Please contact Dr. Harrison **during the first week of lab** if you need classroom accommodations. I am happy to work with you to figure out what you need for lab. Accommodations should be arranged in advance and in accordance with the Office of Disability Services (http://www.disabilityservices.gatech.edu).

10. **Additional resources to help you be successful in BIOS 1107 Lab:** The canvas page offers resources for creating graphs and statistics.
    - Additional resources on t-tests and chi-square tests: http://www.mathbench.umd.edu/
    - Resources on writing: http://owl.english.purdue.edu/ and http://labwrite.ncsu.edu/

Study strategies that may help you in lab: A common mistake of young scientists is relying on your memory. You will be dealing with complex concepts throughout lab. *Take notes* during your TAs introductory discussion and throughout the lab. This will help you with your lab reports. Also please make time to revise your lab reports. Scientific papers go through many rounds of revision before they are submitted for publication!

11. **Grades:** Your lab grade is comprised of the components described below, which are a mix of individual and group assignments:

    - The final lab reports are worth **35%** of your lab grade.
    - The lab report drafts and peer feedback assignments are worth **10%** of your lab grade.
    - Your pre-lab assignments will be **5%** of your lab grade
    - Your research proposals are worth **20%** of your lab grade.
    - Your presentations are worth **15%** of your lab grade.
    - Your participation is worth **15%** of your lab grade.

Lab reports (Individual) (35%):

Scientists must communicate their finding through written reports. Part of the learning objective of this course is to produce and evaluate reports. During lab you will discuss what goes into making strong components of your lab report. You will write 3 lab reports. **They are due to your on Canvas at the beginning of lab and are late if not turned in on time**. **You must attach a copy of an e- signed honor code with each lab report and will lose 1 point if missing.** Late lab reports are 10% off per day late and are not accepted more than 5 days late.. Please remember to check the lab report rubric (in this syllabus) to make sure you are including all the components required. Each lab report will have the following components: Title + Abstract + Figures + Methods + Results + Discussion and be graded for formatting and composition.

Lab report drafts (10%) (Individual):

Before turning in a final version of each draft you will have an opportunity to get feedback from your fellow students to write a better report. Lab report drafts are due on Canvas before your lab meets for the week. You will be randomly assigned 3 other drafts to reach and provide constructive comments on in a peer review session. You will be graded on completion of the assignment as well as how thorough your peer reviews are for others drafts.

Pre-lab assignments (5%) (Individual):

Purpose of pre-labs: Pre-labs help to introduce the concepts covered in the labs and get you thinking about them. They will allow you to come up with an initial experimental idea that you will discuss with your lab mates. You should read the canvas page before working on the pre-lab assignment

Where do I find pre-labs?

Pre-lab assignments will be posted on Canvas by the Friday before your next lab as noted on schedule below.

How do I get credit for pre-labs?

Pre-labs must be completed *before your lab section meets*. It's your responsibility to read the lab in advance (as indicated on the **Schedule** below). **There is no credit for late pre-lab work**, except in the case of an excused absence.

Research Proposal (20%) (Group):

The first week of each lab you will be responsible for generating a research proposal that has looked into the background information of each lab. You will research the topic using outside sources, relate the topic to world events and human health, and develop a question and hypothesis based on your findings. You will be given time to work on these in lab but final versions will be due before lab meets the following week.

Lab presentation (15%) (Group):

Scientists also communicate through presentations to their peers. You will present your hypothesis, experimental methodology, results and a discussion of your findings from any lab done during the semester. Presentations should be between 8 and 10 and minutes long.

Lab participation (15%) (Individual):

You will earn 3 points of credit for attending each lab session attended. You will also receive points for 3 lab notebook checks after each one of the labs, lab notebooks can be kept on paper or online but must contain all sections listed in the rubric. Finally, there will be 2 lab group member evaluations during the semester in which you can receive points from your colleagues for being a positive lab group member.

Concerns about grades:

There is no extra credit offered for BIOS 1107 lab. We think the distribution of points possible to earn is fair. We feel strongly about giving you credit for your weekly participation in lab since doing lab can be a lot of work. Make the lab report rubrics in this syllabus and include all of the required elements. These are your grades, and it is your responsibility to keep up to date with grades posted on Canvas. If a grade on Canvas appears to be inaccurate, e.g., a zero entered for an assignment you turned in, etc., you must contact your TAs within 15 days of the assignment due date in order to petition for a grade change. For the final lab report, you must contact your TA about concerns about grades *before* grades are due to the university (this date can be found on Georgia Tech's academic calendar). After the semester, grade disputes will be handled through the Georgia Tech Grade Grievance policy, which is described in more detail here: http://www.catalog.gatech.edu/rules/20a.php

This is a Core IMPACTS course that is part of the STEM area.

Core IMPACTS refers to the core curriculum, which provides students with essential knowledge in foundational academic areas. This course will help students master course content, and support students' broad academic and career goals.

This course should direct students toward a broad Orienting Question:

- How do I ask scientific questions or use data, mathematics, or technology to understand the universe?

Completion of this course should enable students to meet the following Learning Outcome:

- Students will use the scientific method and laboratory procedures or mathematical and computational methods to analyze data, solve problems, and explain natural phenomena.

Course content, activities and exercises in this course should help students develop the following Career-Ready Competencies:

- Inquiry and Analysis
- Problem-Solving
- Teamwork

Tentative BIOS 1107 Lab Schedule*

Week	Lab Schedule	Assignments due
1 May 12	Intro to Stats, Lab Safety, Animal Behavior Planning	Pre-lab 1: Animal Behavior Biosafety/rDNA Training (Due May 16th) Intro Stats Assignment Due by end of Lab
2 May 19	Animal Behavior: Bean Beetle Plate Set Up	**Research Proposal 1 – Animal Behavior**
3 May 26	Animal Behavior: Counting Eggs	Lab Notebook Check 1 (end of lab) Lab Group Member Evaluation 1 (Due May 30th)
4 Jun 2	Animal Behavior Presentations Macromolecules Planning, Pipette activity	**Lab Report #1 Draft Due – Animal Behavior** Presentation – Animal Behavior Pre-lab 2: Macromolecules
5 Jun 9	Macromolecules: Standard Curve and Experiment	**Lab Report #1 Final Due – Animal Behavior** **Research Proposal 2 – Macromolecules** Lab Notebook Check 2 (end of lab)
6 Jun 16	No Labs - Juneteenth	
7 Jun 23	Macromolecules Presentations Genetics Planning and Plate Spotting	**Lab Report #2 Draft Due –Macromolecules** Presentation – Macromolecules Pre-lab 3: Genetics
8 June 30	Genetics: *C. elegans* Picking	**Lab Report #2 Final Due - Macromolecules** **Research Proposal 3 – Genetics**
9 Jul 7	Genetics: *C. Elegans* Movement assay	Lab Notebook Check 3 (end of lab) Lab Group Member Evaluation 2 (Due July 20th)
10 Jul 14	Genetics Presentations	**Lab Report #3 Draft Due – Genetics** Presentation – Genetics
11 Jul 21	No Labs - Lab over for the semester	**Lab Report #3 Final Due - July 22nd by 11:59 PM**

LAB NOTEBOOK RUBRIC

Criteria ***Scientific approach***	**Specific objectives**	**Level of achievement**	
		Acceptable (1)	Needs work (0)
(1) *Purpose & Hypotheses:* What question is your experiment designed to address? What do you expect to find and what evidence is needed to support this claim? How is your alternative hypothesis(es) grounded in scientific concepts?	(a) The question or objective is stated. (b) Null and alternate hypotheses are stated. (c) Reasoning for hypothesis(es), based on scientific concepts and logic, is explained. (d) Evidence needed to support/reject hypothesis(es) is described.		
(2) *Methods:* How will you address your question? What data will you collect and how? How will you analyze and interpret this data?	(a) Pertinent details are described (e.g., controls). (b) Specific data collection is described in enough detail so the experiment could be replicated. (c) Analysis (including appropriate statistical test, if applicable) and interpretation procedures are described in enough detail so the experiment could be replicated.		
(3) *Findings:* What did you find?	(a) Table of data collected is included. (b) Table is labeled with units and a descriptive title. (c) Results are described. Notes and observations are recorded as appropriate, e.g., problems that occurred; sources of uncertainty in the lab procedure or findings; comparison to others' findings and explanation for differences.		
(4) *Conclusions*: What does your experiment mean?	(a) Do you findings support your hypothesis? (b) What is the next step? If you were to repeat the experiment what could you do to improve it? (c) What future studies do your experiments suggest?		

If your notebook is illegible and/or unorganized, you will lose 2 points

Grade= Scientific approach points+ legible handwriting & organized notebook = 15 points possible to earn

LAB REPORT RUBRIC (note: continues on 2nd page)

Criteria ***Scientific approach***	**Specific objectives**	**Level of achievement**		
		Excellent (2)	Needs work (1)	Absent (0)
(1) Title of lab report	(a) Title clearly conveys a summary of the lab report findings.			
(2) *Abstract:* The abstract helps the reader to understand the larger document by acting as a summary or "pre-reading" of the key points. The abstract describes the question your experiment is designed to address and its scientific merit. The abstract is concise yet complete: ≤ 300 word paragraph summary. 1-2 well-developed sentences articulate each objective listed.	(a) Particular question/objective and (alternative) hypothesis addressed in experiment are stated. Null hypothesis not stated. (b) Purpose or motivation for experiment is linked to a biological explanation and "big picture." (c) Experimental approach taken to address the question is briefly summarized. (d) Major findings and interpretations are described using actual values. (e) Judgment about the hypothesis is linked to findings (*p* value). (f) Why this matters & specific significant implications of this experiment are described. (g) The abstract is concise (≤300 words) with all relevant details.			
(3) *Methods:* How will you address your question? What data will you collect and how? How will you analyze and interpret this data?	(a) Begins with 1-2 sentences describing the overall experimental design, including the purpose of the experiment. (b) Specific data collection is described with the appropriate amount of detail so the experiment could be replicated, with pertinent details described. (c) Analysis and interpretation procedures, e.g., statistical test including alpha value, are described and are appropriate for the data & question.			
(4) *Results:* What did you find?	(a) Begins with 1-2 sentences describing the overall findings of the lab. (b) Findings from the experiment and data analysis are described in adequate detail including values of quantitative measurements and stating *p*-value if a stats test was used, but without making explanations or conclusions about the data.			
(5) *Discussion:* What do your findings mean? What did you expect to find and	(a) Begins with a statement relating the overall results to the hypothesis.			

what evidence would be needed to support your hypothesis? Interpret your results with regard to your hypothesis.	(b) Findings are described and interpreted. Findings may be compared to others' findings. This is 1-2 paragraphs in length. (c) Specific analyzed data (i.e., results from stats if used) is used as evidence to decide whether the hypothesis is supported. Scientific concepts are used accurately and convincingly to explain whether the data supported the hypothesis. (d) Other issues are addressed as appropriate, e.g., problems that occurred; sources of uncertainty in the lab procedure or findings; improvements or extensions of the experiment. (e) Why this matters & significant implications of this experiment are described.			
(6) *Figures & tables:* Graphs; drawings, diagrams, tables.	(a) Visuals are appropriate for the type of data. (b) Correct format is used (titles, graph components). Statistical significance is indicated. (c) Figure legends accurately and succinctly describe the methods used to collect the data and the data presented (d) Visuals are discussed and clearly referenced in text of Results & Discussion (not in the abstract) and displayed at the end.			
Composition (7) *Writing:* Grammar; spelling; clarity and conciseness of sentences; flow of ideas; use of technical terminology.	(a) There are no grammatical or spelling errors. (b) Sentences are clear and to the point. (c) Flow of ideas is cohesive and logical. (d) Use of technical terminology is appropriate and words are abbreviated or italicized as appropriate (e.g., species names)			
(8) Format of report: Organization; page formatting; font style; Honor Agreement	(a) Report is written entirely in sentences organized as paragraphs (not bulleted list). (b) Report is organized into sections (i.e., abstract, methods, etc.) with headings that are bold. (c) Page format: Times New Roman 12 pt font (even for headings); 1 inch margins; double-spaced; pages are numbered and stapled as needed. (d) Georgia Tech Honor Agreement is included at end of report with signature.	0 or 1 point for present or absent		

Other important criteria for your lab report:

1. **Grade**= (Scientific approach points *x* 2) + (Composition points)= 100 points possible to earn for complete lab report
2. Do not include a **separate title page**. We are a green campus. Please save paper and money.

3. Your lab report should include your **lab section number** and your **TAs' names**.
4. You must include a **printed copy of the rubric** with your lab report. If you fail to do so, 1 point will be deducted from your lab report grade.

Presentation Rubric

Presentation Element	Accomplished	Average	Developing	Score
Introduction	• Effectively conveys background and reason for experiment. • Reason is connected to a clearly stated hypothesis. Null Hypothesis is not stated.	• Missing small points of background. • Reasoning does not clearly link to hypothesis. Null hypothesis is not stated.	• Missing large points of background information or is not conveyed • Reasoning in not linked to hypothesis at all. Null hypothesis stated	
Methods	• Methods are explained in enough detail that experiment could be replicated. • Statistical test used is described and appropriate for the experiment.	• Methods are lacking small details that impede replication. • Statistical test used is described and appropriate for the experiment.	• Methods are lacking large details making replication impossible. • Statistical test used is either not described or not appropriate for the experiment.	
Results	• Overall findings are related in relevant detail (including *p*-value from stats test). • Figures are included and can be interpreted on sight without help of presenter but figures are also adequately explained.	• Overall findings are related but lacking detail (lacking *p*-value from stats test). • Figures are included and adequately explained but require explanation from presenters.	• Overall findings are not related. • Figures are not included, adequately explained or are not appropriate for gathered data.	
Discussion	• Findings are interpreted and analyzed. Data are used to determine if hypothesis is supported. • Other issues are addressed as appropriate, including problems with the experiment and sources of error in the experiment. • Future research questions based on findings are proposed.	• Findings are interpreted and analyzed data is incorrectly used to determine if hypothesis is supported. • Sources of error or problems are unrealistic. • Future research questions are proposed but not based on findings of lab.	• Findings are interpreted and analyzed data is not used to determine if hypothesis is supported. • Other issues such as problems with the experiment and sources of error in the experiment are not addressed.. • Future research questions based on findings are not proposed.	
Style	• Slides are clear, concise and visually appealing. • All presenters speak using slides as a prompt, rather than reading. • Time is appropriate	• Slides are slightly unclear. • All presenters speak and spend considerable time reading from slides • Presentation is slightly over or under time (1 minute)	• Slides are muddled and difficult to understand • Not all presenters speak • Presentation is over or under time (>1 minute)	

- Accomplished =3 pts
- Average = 2pts
- Developing = 1pt
- All points doubled except style.
- Presentation should be 8-10 mins long