

**BIOL 1207 L: Biological Principles Project Lab Fall 2026**  
**Laboratory Syllabus**

**Course Instructor:** Colin Harrison – [colin.harrison@biosci.gatech.edu](mailto:colin.harrison@biosci.gatech.edu)  
Drop-In Hour Monday 11:00-12:00PM

**TAs:** TA information is available on the Canvas page under people and on the canvas homepage

**BIOL 1207 Laboratory Policies**

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Note: This syllabus is subject to change.

**1. Lab structure**

This lab is designed to introduce Biology majors to biological principles and the process of designing an experiment. BIOL 1207 lab will be exploring a project related to the COVID-19 pandemic. You and your lab group will use bioinformatics techniques to study COVID-19 and COVID-19 related proteins, develop a testable hypothesis, and create a research proposal based on your findings. Your proposal work has the potential to identify areas of study for future work with the COVID-19 virus. Most importantly, this course will be exciting, and you will make your own discoveries, and we expect that you will develop knowledge and skills that extend beyond the classroom! 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. Please bear in mind that the 1207L schedule may change as the semester progresses to accommodate for your projects.

**2. Learning Objectives**

After participating in Biology 1207 Lab, we expect that you will be able to do the following:

- A. Interpret and summarize primary biological literature.
- B. Create a testable scientific hypotheses regarding real world scientific issues.
- C. Work in groups to design experiments and gather background data to inform future experimental directions.
- D. Learn how to utilize computational/bioinformatics programs to answer scientific questions.
- E. Utilize and understand the function of common molecular biology techniques
- F. Communicate their research findings in both written, short presentation, and poster formats.

- 2. Safety in Lab:** While in lab all students will be required to wear all appropriate PPE. This includes goggles, lab coats, and gloves doing wet lab experiments (end of semester). 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.

### 3. Absences:

- a. Please read below and make sure that you understand the policies and procedures laid out below. **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.
- a. *For other situations:* If you have to miss class for any other reason please contact Dr. Harrison AND your TAs on the 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.**

4. **Plagiarism will not be tolerated.** On the first day of class, we will discuss what plagiarism is, particularly in the context of group work. Most of the work you do in lab will be with your group. Though your project is designed as a group, your notes in your notebook must be in your own words, not copied from a group member's notes. However, you'll be turning in several written assignments and presentations that will be created as a group. Since your name is on this work, you're responsible for being completely certain that the *entire work* meets the standards of the honor code. Anything written that is not an original idea of yours must be referenced. Direct copying from other students' work will result in a grade of "0" for that assignment. Your conduct is expected to conform to the Georgia Tech Honor Code (<http://www.honor.gatech.edu>). Please familiarize yourself with its expectations and responsibilities. Assignments will be run through TurnItIn® software plug-in on Canvas.

5. **AI Policy:** AI may be used in any capacity in any writing assignment for this course, and any use of AI must be acknowledged appropriately in the AI Contributions section of the assignment. The AI Contributions portion should be included in every writing assignment and must include the following: a) identify the AI you used; b) describe how you used it/what you used it for; c) state the reason you chose to use AI in this way; d) describe what steps you took to verify the AI output. A separate entry should be included for each AI platform that you used.

If you did not use any form of AI in your assignment, then your AI Contributions section must include the following: a) state that AI was not used, and b) explain the reason you chose not to use AI. Any indication that AI was used without proper acknowledgement may result in referral to OSI for investigation of academic misconduct. With any use of AI, you should always scrutinize any editing or response you get from the AI; although AI tools are becoming more sophisticated and can generate answers to increasingly complex questions, this does not mean that they are the correct answers.

6. **Grades.** Your lab grade is comprised of the components described below, all assignments are due by the time your lab meets unless stated in the syllabus:

- Group project components are worth 35% of your lab grade:
  - Annotated bibliographies (two, each worth 5%) are worth 10%.
  - Protein Structures 10%

- Poster Draft 5%
- Final Poster 10%
- Class individual participation components are worth 65% of your lab grade:
  - Weekly reflection statements are worth 15%.
  - Proposal Draft Sections (Abstract, Intro, Background Data/Discussion, Research Approach ) 5%
  - Final Proposal is worth 25%
  - Lab participation is worth 20%. Participation includes attendance and active participation in synchronous sessions, first week assignments, SimBio Modules, lab notebook checks (2), and group evaluations (2). Tardiness to lab without excuse will result in a deduction of 1% for each 10 minutes.
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- **A 10% penalty per day late up to 5 days. Notebook checks are not accepted late.**
- **AI Contributions Grade Penalty**  
Failure to include AI contribution or AI contributions section, not adequately describing AI use, not completing all portions of the AI contributions section on all written assignments will result in a 10% score reduction for the assignment (all written assignments except AI Writing Assignment).

## 7. **Class discussions about journal articles and experimental design.**

Reading, understanding, discussing and critiquing research papers and thinking through experimental design is crucial to doing science. Since we're working together to learn about new ideas together, I expect that you will contribute to our class discussions about experimental design and journal articles. This means sharing at least one specific question or comment to each discussion.

## 8. **Required material**

There is no required lab manual and nothing you need to purchase outside of PPE. You do need a computer and will be required to access the SimBio learning platform (license provided) and download free PYMOL software during the semester. If you don't have a laptop computer we will work with you to make sure you have access when necessary.

## **Advice from former 1207 and 1208 students to aid in your success:**

### *Literature searches:*

- Don't underestimate the value of the annotated bibliographies. The ability to understand and utilize others' writing is so useful in research.
- Do tons of research on your topic. Don't be afraid to investigate something different.
- Be creative and read many research papers for ideas on project topics.
- Find as much literature on your topic as you can. It will save you a lot of time in the end.
- Endnote or other citation tools can be really useful for literature reviews.

### *Organization and group work:*

- Pick group members who have similar interests in research topics. Don't just work with people you like.
- More than anything else, develop a good relationship with your groupmates. It will help you to communicate more effectively with them and also to get work done better. Also, it will be a more enjoyable experience because you will be spending a lot of time in lab with them and outside too.
- Keep communication open and honest with group members. Be sure to plan meetings ahead of schedule and clearly distribute work.

- Create a regular timeline listing goals and coursework over time, and update them if plans change. It can get overwhelming when you realize you have a lot due the next week and not much time to do it.

*General advice:*

- Don't be frustrated when you aren't given instructions. Be confident in trying things and be ready to problem solve to fix mistakes.
- Understand that all the hard work you will put in will teach you about science and it all has a point.

## **Most of all...Have fun & have a terrific semester!**

**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 Lab Schedule (subject to change)

Date	Week	Activity	Assignments due*
Week 1 – 8/24	1	<i>No Lab: First Week of Classes – Must Complete Intro Survey, AI Survey, and Ethical Use of AI Assignments before your first lab session</i>	Intro Survey, AI Survey, Ethical Use of AI Due by Friday 8/28
Week 2 – 8/31	2	Group Formation and Intro to COVID-19 and Protein Structure, SimBio Modules	
Week 3 – 9/7	3	<i>No Lab: Labor Day</i>	
Week 4 – 9/14	4	COVID-19 Background Research – Group Select COVID-19 Protein of Interest	Reflection 1
Week 5 – 9/21	5	Human Protein Background Research – What are Human Proteins that Interact with your COVID-19 Protein	Reflection 2 Annotated bibliography 1
Week 6 – 9/28	6	NCBI Database Search – How Does your COVID-19 Protein Relate to Other Coronavirus Protein/What kind of Variability is in your Human Protein	Reflection 3 Lab Notebook Check 1
Week 7 – 10/5	7	Hypothesis Generation and PYMOL Intro	Reflection 4 Annotated Bibliography 2 Lab Group Evaluation 1
Week 8 – 10/12	8	<i>No Lab Fall Break</i>	
Week 9 – 10/19 WET LAB	9	PYMOL Exploration of COVID-19 Protein of Choice <b>Pipette Practice, Starter Culture</b>	Reflection 5 Intro Draft
Week 10 – 10/26 WET LAB	10	PYMOL Mutagenesis Study/Hypothesis Edit <b>Grow Bacteria in liquid Culture</b>	Reflection 6
Week 11 – 11/2 WET LAB	11	Future Directions and Approach – How Would you Study Your Hypothesis? <b>Protein Extraction</b>	Reflection 7 Background Data/Discussion Draft
Week 12 – 11/9 WET LAB	12	<b>Western Blot</b>	Reflection 8 Research Approach Draft
Week 13 – 11/16 WET LAB	13	Poster Work Time/Proposal Work Time <b>Western Blot Analysis</b>	Reflection 9 Abstract Draft Poster Draft due at End of Lab
Week 14 – 11/23	14	<i>No Lab - Thanksgiving</i>	
Week 15 – 11/30	15	Presentation	Lab Group Evaluation 2 Lab Notebook Check 2 Final Poster Presentation Final Paper Due December 2 <sup>nd</sup> by 11:59 PM

Please bear in mind that the 1207L schedule may change as the semester progresses to accommodate specific project needs.

\*Unless otherwise specified, all assignments are due at the start of lab through Canvas

## BIOS 1207 Lab Proposal Rubric

Criteria <i>Scientific approach</i>	Specific objectives	Level of achievement		
		Excellent (2)	Needs work (1)	Absent or Incorrect Information or AI Hallucinations (0)
(1) <i>Abstract</i> : The abstract helps the reader to understand the larger document by acting as a summary or “pre-reading” of the key points. Abstract is concise yet complete: a 100-150 word paragraph summary. 1-2 well-developed sentences articulate each objective listed.	<ul style="list-style-type: none"> <li>(a) Purpose or motivation for experiment is linked to concepts and “big picture,” how this knowledge helps in understanding COVID-19</li> <li>(b) Particular question and hypothesis addressed in experiment are stated.</li> <li>(c) Steps taken in developing background data detailed.</li> <li>(d) Preliminary background data is described.</li> <li>(e) Future experimental approach briefly discussed</li> <li>(f) Explain how this project would contribute to future research in COVID-19 research</li> </ul>			
(2) <i>Introduction</i> : What question is your proposal designed to address? What do you expect to find and what evidence would be needed to support this claim? How are these hypotheses grounded in scientific concepts? What is the relevant background information and previous research that sets up your question?	<ul style="list-style-type: none"> <li>(a) The question or objective is well-defined.</li> <li>(b) Alternate hypothesis(es) is stated. Null hypothesis is not stated.</li> <li>(c) Reasoning for hypothesis(es), based on scientific concepts and logic, is explained.</li> <li>(d) Evidence needed to support/reject hypotheses is described.</li> <li>(e) Relevant background and previous research findings are cited.</li> </ul>			
(3) <i>Background Data and Discussion</i> : What does your computational data say about the structure of your chosen proteins? How does your data relate to the larger issue? How does your data inform your hypothesis?	<ul style="list-style-type: none"> <li>(a) Approach taken to generate data discussed.</li> <li>(b) Data described in detail.</li> <li>(c) Data supported by visuals.</li> <li>(d) Detailed data utilized to support explanation of hypothesis.</li> <li>(e) Data connected back to previous findings in the scientific literature</li> </ul>			
(4) <i>Research Approach</i> : How will you address your question? What data will you collect and how? How will you analyze and interpret this data?	<ul style="list-style-type: none"> <li>(a) Begins with a statement relating the overall research approach to the hypothesis.</li> <li>(b) Propose as series/set of experiments that would help you to ascertain the validity of the hypothesis.</li> <li>(c) Discuss what you would expect to be the result of your series/set of experiments based on your hypothesis.</li> <li>(d) Discuss how potential findings would fit into big picture.</li> </ul>			
<b>Presentation</b> (5) <i>Writing</i> : Grammar; spelling; clarity and conciseness of sentences; flow of ideas; use of technical terminology.	<ul style="list-style-type: none"> <li>(a) There are no grammatical or spelling errors and italics are used as needed.</li> <li>(b) Sentences are clear and to the point.</li> <li>(c) Flow of ideas is cohesive and logical.</li> <li>(d) Use of technical terminology is appropriate.</li> <li>(e) Writing is understandable to non-scientist professionals.</li> </ul>			
(6) <i>Figures &amp; tables</i> : Graphs, images, drawings, diagrams, and/or tables.	<ul style="list-style-type: none"> <li>(a) Correct format is used (titles, captions, graph components) and visuals are well-suited to the data.</li> <li>(b) Visuals are discussed and clearly referred to in text and arranged in an order that effectively conveys the data’s “story.”</li> </ul>			
(7) <i>Formatting</i>	<ul style="list-style-type: none"> <li>(a) Word document: 12 pt Times New Roman, 1 inch margins, single-spaced with a space between paragraphs</li> <li>(b) Title of paper is relevant and interesting; conveys findings</li> <li>(c) 10 peer-reviewed references are included and formatted according to <i>Ecology</i>.</li> </ul>			

**Grade**= (Scientific approach points  $\times$  2) + (Presentation points)= 100 points possible to earn for final lab paper.

## Poster Rubric

Criteria	Expert	Proficient	Apprentice	Novice	Score
Introduction	<ul style="list-style-type: none"> <li>Effectively conveys background and reason for the experiment</li> <li>Reason is connected clearly to stated hypothesis. Null hypothesis not stated</li> </ul>	<ul style="list-style-type: none"> <li>Adequately conveys background and reason for experiment</li> <li>Reason is connected to stated hypothesis. Null hypothesis not stated</li> </ul>	<ul style="list-style-type: none"> <li>Conveys some background but lacking details, reason for experiment is confused</li> <li>Reason is only weakly linked to hypothesis. Null hypothesis may be stated</li> </ul>	<ul style="list-style-type: none"> <li>Minimal or superfluous background information and reason for experiment</li> <li>Reason not linked to hypothesis. Null hypothesis stated</li> </ul>	
Methods	<ul style="list-style-type: none"> <li>Methods for generating background data described in sufficient detail</li> </ul>	<ul style="list-style-type: none"> <li>Methods for generating background data described but either lacking detail or have too much information</li> </ul>	<ul style="list-style-type: none"> <li>Methods for generating background data are unclear and lacking detail</li> </ul>	<ul style="list-style-type: none"> <li>Methods for generating background data are incorrect and lacking detail</li> </ul>	
Preliminary Data	<ul style="list-style-type: none"> <li>Overall preliminary findings described effectively</li> <li>Figures included effectively display preliminary data</li> </ul>	<ul style="list-style-type: none"> <li>Overall preliminary findings described adequately</li> <li>Figures included adequately display preliminary data</li> </ul>	<ul style="list-style-type: none"> <li>Overall preliminary findings are unclear and lacking detail</li> <li>Figures included display preliminary data but are lacking in quality</li> </ul>	<ul style="list-style-type: none"> <li>Overall preliminary findings are not described or are incorrect</li> <li>Figures included are not appropriate for data and don't highlight info</li> </ul>	
Discussion	<ul style="list-style-type: none"> <li>Preliminary data effectively related to background info and larger picture</li> </ul>	<ul style="list-style-type: none"> <li>Preliminary data adequately related to background info and larger picture</li> </ul>	<ul style="list-style-type: none"> <li>Preliminary data related to background info and larger picture but lacking detail</li> </ul>	<ul style="list-style-type: none"> <li>Preliminary data incorrectly related to background info, larger picture lacking</li> </ul>	
Future Directions	<ul style="list-style-type: none"> <li>Future experiments effectively discussed</li> <li>Expected results effectively conveyed</li> </ul>	<ul style="list-style-type: none"> <li>Future experiments adequately discussed</li> <li>Expected results adequately conveyed</li> </ul>	<ul style="list-style-type: none"> <li>Future experiments discussed but lacking details</li> <li>Expected results lacking detail</li> </ul>	<ul style="list-style-type: none"> <li>Future experiments are inappropriate for this scientific subject</li> <li>Expected results not scientifically supported</li> </ul>	
Oral Presentation	<ul style="list-style-type: none"> <li>Thoroughly but concisely presents main points of introduction, hypotheses, research methods, data, discussion, and future directions in a well-organized manner</li> </ul>	<ul style="list-style-type: none"> <li>Adequately presents main points of introduction, hypotheses, research methods, data, discussion, and future directions in a fairly well-organized manner</li> </ul>	<ul style="list-style-type: none"> <li>Presents main points of introduction, hypotheses, research methods, data, discussion, and future directions but not as sufficiently and not as well-organized</li> </ul>	<ul style="list-style-type: none"> <li>Does not sufficiently present main points of introduction, hypotheses, research methods, data, discussion, and future directions and is not well-organized</li> </ul>	

	<ul style="list-style-type: none"> <li>• Narration and/or answering of questions is engaging, thorough, and adds greatly to the presentation</li> </ul>	<ul style="list-style-type: none"> <li>• Narration and/or answering of questions is adequate and adds to the presentation</li> </ul>	<ul style="list-style-type: none"> <li>• Narration and/or answering of questions is somewhat lacking</li> </ul>	<ul style="list-style-type: none"> <li>• Narration and/or answering of questions is lacking</li> </ul>	
Visual Presentation	<ul style="list-style-type: none"> <li>• Overall visually appealing; not cluttered; colors and patterns enhance readability</li> <li>• Uses font sizes/variations which facilitate the organization, presentation, and readability of the research</li> <li>• Graphics (e.g., tables, figures, etc.) are engaging and enhance the text</li> <li>• Content is clearly arranged so that the viewer can understand order without narration</li> </ul>	<ul style="list-style-type: none"> <li>• Overall visually appealing; not cluttered; colors and patterns support readability</li> <li>• Adequate use of font sizes/variations to facilitate the organization, presentation, and readability of the research</li> <li>• Graphics (e.g. tables, figures, etc.) enhance the text</li> <li>• Content is arranged so that the viewer can understand order without narration</li> </ul>	<ul style="list-style-type: none"> <li>• Visual appeal is adequate; somewhat cluttered; colors and patterns detract from readability</li> <li>• Use of font sizes/variations to facilitate the organization, presentation, and readability of the research is somewhat inconsistent/distracting</li> <li>• Graphics (e.g., tables, figures, etc.) adequately enhance the text</li> <li>• Content arrangement is somewhat confusing and does not adequately assist the viewer in understanding order without narration</li> </ul>	<ul style="list-style-type: none"> <li>• Not very visually appealing; cluttered; colors and patterns hinder readability</li> <li>• Use of font sizes/variations to facilitate the organization, presentation, and readability of the research is inconsistent/distracting</li> <li>• Graphics (e.g., tables, figures, etc.) do not enhance the text</li> <li>• Content arrangement is somewhat confusing and does not adequately assist the viewer in understanding order without narration</li> </ul>	
Sources/Citation	<ul style="list-style-type: none"> <li>• Cites all data obtained from other sources. Citation style is accurate and consistent</li> </ul>	<ul style="list-style-type: none"> <li>• Cites most data obtained from other sources. Citation style is accurate and consistent</li> </ul>	<ul style="list-style-type: none"> <li>• Cites some data obtained from other sources. Citation style is inconsistent or incorrect.</li> </ul>	<ul style="list-style-type: none"> <li>• Does not cite sources.</li> </ul>	
Spelling and Grammar	<ul style="list-style-type: none"> <li>• No spelling &amp; grammar mistakes</li> </ul>	<ul style="list-style-type: none"> <li>• Minimal spelling &amp; grammar mistakes</li> </ul>	<ul style="list-style-type: none"> <li>• Noticeable spelling and grammar mistakes</li> </ul>	<ul style="list-style-type: none"> <li>• Excessive spelling and/or grammar mistakes</li> </ul>	

\*Maximum points 56. All bullet points add a maximum of 4 points to grade for expert level, excluding Sources/Citation and Spelling and Grammar which have 2 points max.