BIOS 4690 Independent Research Project Syllabus

3 credits

Summer 2026

Instructor Information

Instructor: Dr. Chrissy Spencer

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General Course Information

Description

BIOS 4690 is a 3-credit research-based course to fulfill the senior research requirement. Students will gain experience in designing, implementing, and communicating a biology research project, and practical training in modern approaches for biological research. The research project will be designed, implemented, and analyzed in collaboration with the research supervisor (PI) you have identified.

Students cannot receive course credit for BIOS 4690 and also be paid for the same research hours.

Course Learning Outcomes

By the end of this class, students will be able to:

1. Design and implement experiments to test scientific hypotheses
2. Implement appropriate techniques and methods to conduct scientific research
3. Write a complete scientific manuscript

Required Course Materials

This course does not have required materials beyond PPE when required by your PI.

Georgia Tech has a strict policy regarding appropriate clothing in laboratories where chemicals and organisms are used or manipulated. Students not conforming to the following requirements will need to leave the lab to acquire appropriate clothing before returning. In the laboratory, students must wear

1. Long pants.
2. Close-toed shoes that cover the sides and top of the foot.

3. Lab coats, when working at the bench. Lab coats must be 100% cotton and cover the wearer to the knees. Students are responsible for keeping their lab coats in good condition and reasonably clean so as to not create a hazard.
4. Safety glasses, when working at the bench. Safety glasses must have side shields for splash protection and conform to the wearer's face. Glasses must be worn over prescription glasses and contact lenses. Georgia Tech Biology provides safety glasses for student use in the lab. Safety glasses prevent eye exposure to liquid reagents and breakables, as well as dangerous substances such as bacteria, toxins, acids or UV light.

Not all research occurs in a laboratory, so consult with your PI regarding appropriate safety attire, equipment, and training for your particular research project.

Grading Policy:

The final grade is based on student research and the ability to communicate that research in a research manuscript.

Assignment	Due Date	Weight
Syllabus and PI confirmation	Due on Canvas by Tuesday of the first week of classes.	10%
Research Proposal	Due to your PI and as a submission on Canvas by midnight Friday of the 3rd full week of classes. *In summer session, this assignment is typically due in the 2nd week of classes.*	10%
Research activity	Weekly throughout the semester, in agreement with your research supervisor	40%
Second Reader selection	Due on Canvas 4 weeks before the Final Instructional Class Day	10%
Preliminary manuscript	Due to your PI by email *and* as a submission on Canvas by midnight *one week prior* to the Final Instructional Class Day	10%
Final manuscript	Due to your PI *and* Second Reader by email, and as a submission on Canvas, all by midnight on the Final Instructional Class Day.	20%
Await manuscript review, grade, and possible comments	During exams week	
Revised final manuscript	By the last day of exams	

[Specify how final grades will be determined, including weighting scales or points assigned to various course requirements. Your grading process and scoring methods should be clearly stated, allowing students to reasonably predict progress towards their final grade throughout the semester. Finally, you should define your approach to calculating course grades, including how assignments and exams are weighted, so that students can clearly see the ways in which their work and grades earned along the way will contribute to their final grade in the course. (See Georgia Tech Regulation V.A Grades)]

Your final grade will be assigned as a letter grade according to the following scale:

Letter Grade	Percentage
A	90-100%
B	80-89%
C	70-79%
D	60-69%
F	0-59%

Description of Graded Components

a) Syllabus and PI Confirmation

Complete the Canvas Assignment to confirm you have read the syllabus and provide contact information for your research supervisor (PI)

b) Research Proposal

The research proposal consists of a short plan of the project to be conducted. The proposal should be 500-1000 words and should include most if not all of these, as determined by the type of research you are conducting: a title, introductory background and justification, hypotheses (if applicable) or research question, experimental design, expected data analysis, statement of expected results, and how the results relate to the introduction. In addition, the proposal should contain at least five citations in-text, and it should include a journal-style literature cited section (not included in the word limit) in a citation style appropriate for your field of research (consult with your PI on preferred citation styles). All writing assignments documents should be submitted directly to the Research Supervisor and also submitted electronically to the course Canvas site. Canvas submissions should be formatted as .doc, .docx, or .pdf filetypes, single-spaced with 12-point font and 1-inch margins on all sides.

c) Research Activity

The student works throughout the semester on their project for ~9 hr per week for regular Fall and Spring semesters, ~12.6 hr per week in the Full Summer semester, and ~27 hr-week for the Short Summer semester. This weekly research timing allows the student to complete 135 hours of research in a balanced way across the semester. The student may receive help from others in the lab group when needed, but the project should be run by the undergraduate student.

d) Second Reader Selection

The student and PI agree on another faculty member who can provide appropriate additional feedback on your research work; this person is known as the second reader (because your PI will be the 'first' reader on your manuscript). To select a second reader, the student and PI should consult and agree on someone who holds a PhD in a relevant field and who has appropriate content expertise to provide a sound review of the science. Typically, second readers are members of the Georgia Tech Faculty. Faculty who are already serving as second readers for other student's projects are likely to decline; asking earlier can help secure a second reader.

For students with PIs or research supervisors not affiliated with the School of Biological Sciences (see link below), the second reader should be selected from the School of Biological Sciences faculty/adjuncts/courtesy appointments, unless otherwise approved by the 4690 Biological Sciences supervisor. This is for degree integrity for the Biology major; faculty affiliated with the School of Biological Sciences should read and sign off on your work.

More information about the second reader's role can be found below under "Final manuscript."

e) Preliminary manuscript

During the second half of the semester, the student prepares a draft manuscript to be reviewed, commented, and graded by the PI. Format and contents should be arranged with the PI and should comprise draft elements of the final manuscript related to the student's research project. Best practices for the preliminary manuscript are that it be >1500 words long and include the background, justification, and goals for the research project. Elements of the methods, results, and discussion may be included depending on how far the project has advanced. The preliminary manuscript should cite at least 5 different articles, with citations in-text and a journal-style literature cited section listed at the end of the manuscript (not included in the word limit). Feedback from the instructor can then be used to improve the style and content for re-submission as part of the final manuscript. All writing assignments documents should be submitted directly to the Research Supervisor and also submitted electronically to the course Canvas site. Canvas submissions should be formatted as .doc, .docx, or .pdf filetypes, single-spaced with 12-point font and 1-inch margins on all sides.

f) Final manuscript

Should be ±3500 words (exact length is at the discretion of your PI) and include figures and/or tables, and at least 10 citations. The final manuscript must include an abstract, introduction, methods, results, and discussion. Data should be appropriately summarized and provided in tables and/or figures with legends. The final manuscript should cite at least 10, and probably many more, different articles, with citations in-text and a journal-style literature cited section listed at the end of the manuscript (not included in the word limit).

The research supervisor and student should select a relevant scientific journal and model the final manuscript after a submission to that journal, including use of the journal's preferred citation style.

Each student will write their own final manuscript in their own words, following the guidelines and best practices in the academic integrity section of this syllabus. All writing assignments documents should be submitted directly to the Research Supervisor and also submitted electronically to the course Canvas site. Canvas submissions should be formatted as .doc, .docx, or .pdf filetypes, single-spaced with 12-point font and 1-inch margins on all sides.

Final manuscript revisions, if needed

The PI (first reader) and the second reader will read the student's work and then communicate with each other to decide on a grade. The student should receive an evaluation (written or oral) from the PI at the end of the semester summarizing the strengths and weaknesses of the project. The second reader may also submit comments back to the student.

The PI is responsible for communicating the course student grade to the student and to the Instructor of Record for BIOS 4690 on or before the Friday after exams end.

If the PI and second reader determine that substantial revision is warranted before assigning a grade, then the student may be offered the opportunity to resubmit. In that case, please also resubmit the latest revision to the Final Manuscript assignment on Canvas.

Footnotes about the writing assignments

Note that the structure and length of the Research Proposal, Preliminary Manuscript, and Final Manuscript may be more rigorous at the request of the research supervisor.

Students completing the Research Option courses LMC 4701 and 4702 have permission to freely repurpose their work in those courses for this course, and vice versa, as per Dr. Chrissy Spencer (BIOS 4690) and Dr. Courtney Hoffman (LMC 4701 and 4702). These courses are intended to work in synergy to help students generate a strong research article.

USG Required Course Policies

Attendance and/or Participation

Students will work with their supervisors to develop a schedule that will fulfill the required hours for this class (135 hours expected). Any alterations to the schedule must be agreed upon by the supervisor and student. Missing scheduled research without prior notification may result in a 5% grade deduction per instance.

Students are responsible for communicating any absences (including Institute Approved Absences) directly to their research supervisor and providing a plan for how the research we be completed.

Academic Integrity

While students will often collaborate in performing the experiments and collecting the data, each student is expected to write their own notebooks and manuscripts, including creating their own tables and figures. Plagiarism includes reprinting the words or ideas of others without citation. As direct quotes are seldom used in scientific writing, you are expected to rephrase the words of others and provide the citation. If this is unclear, please consult with your instructor as your write before turning in your assignment.

This course uses TurnItIn plagiarism detection software and releases the report directly to the student upon submission. As you review your report, if you see similarities to the work of others, then you need to address those immediately and resubmit with a revised filename that makes it clear which version is the revision. Note that if you are submitting your same thesis to LMC 4701 and 4702 as part of the research option, this is a case where I expect you will submit the same document to both that course and this course. Simply check the report to confirm that the similarities detected are solely from your own work submissions in these different courses.

Academic dishonesty will not be tolerated. This includes plagiarism, cheating, lying about course matters, stealing classroom materials, or helping others commit a violation of the Honor Code. Students are reminded of the obligations and expectations associated with the Georgia Tech Academic Honor Code and Student Code of Conduct, available online at www.honor.gatech.edu. Any infractions will be submitted to the Office of Student Integrity for adjudication.

Course Policies

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services (404-894-2563) as soon as possible to make an appointment to discuss your special needs and to obtain an accommodations letter. Please then

communicate any relevant accommodations to your PI and to me. I am happy to discuss your accommodations and learning needs.

Student-Faculty Expectations Agreement

As members of the Georgia Tech community, we are committed to creating a learning environment in which all of our students feel safe and included. Because we are individuals with varying needs, I rely on your feedback to achieve this goal. To that end, I invite you to enter into dialogue with me about the things we can stop, start, or continue doing to make our research experience an environment in which every member feels valued and can engage actively in our community.

At Georgia Tech, we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. The Student-Faculty Expectations articulate some basic expectations that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.

Class Administration

BIOS 4690 students technically have two supervisors, the 'research supervisor' and the 'School of Biological Sciences supervisor/Instructor of Record'.

- The research supervisor or PI will be the Principal Investigator who oversees the student in their research throughout the semester (practically, students may work with graduate students or postdocs on a day-to-day basis, and PI is the person who runs the research group). The research supervisor will serve as the primary director and assessor of the student during the research. The student is expected to work closely with the research supervisor regarding all course activities. In addition, the research supervisor will work with the student to develop the reports, to assess the quality of those reports, and to assign an overall grade at the end of the semester.
- In contrast, the Biological Sciences supervisor will act as the administrative manager of the course. In most cases, student contact with the Biological Sciences supervisor will likely be limited to emails and contacts through Canvas. However, when needed, students are encouraged to contact the Biological Sciences supervisor at any time to address concerns, issues, questions, or problems regarding the research. It is important to address concerns as they arise rather than try to resolve the outcome of a longer-term underlying issue. The Biological Sciences supervisor will help to ensure that the research proceeds properly for all parties involved.

Pre- &/or Co-Requisites

- A minimum of 1 credit of BIOS 2698/2699/4698/4699 prior to enrolling in BIOS 4690.

- BIOS 4460 (Communicating Biological Research) can be taken concurrently or in the subsequent semester; students present their research from BIOS 4690 in 4460.

- If a student is completing BIOS 4690 as part of the Research Option through the Undergraduate Research Opportunities Program, they will need to complete the LCC 4701 pre-requisite and LCC 4702 co-requisite for the Research Option.

- This course is permit only.

Collaboration, Group Work, and Use of Generative AI

Own work: In every aspect of this course, you are to write in your own words and give credit to the words and ideas of others.

Writing Assistance: For written assignments, you may want or need to set up an appointment for interactive writing assistance from tutors in the Communication Center (communicationcenter.gatech.edu) in the CULC. Viewing and absorbing the content from the Avoiding Plagiarism workshop from the GT Library and information on Canvas will help prevent concerns about academic integrity.

Artificial Intelligence and Writing: AI is very good at editing, synthesis, and finding basic themes. It is also a good proofreader for syntax and grammar. It is not yet proficient at writing accurate scientific information from a prompt or outline. You are free to and encouraged to make use of the benefits of AI for your writing, with the understanding that you are fully responsible for the final product you submit. If you use an AI writing assistant (e.g., CoPilot, ChatGPT), this should be acknowledged in your assignment's attribution section.

Discussion Board and Zoom session

Because you are all working in different lab groups, we don't have many opportunities to build community in this course. Two ways you can meet other research students are by completing the discussion board entry on canvas and by attending the Zoom call we will schedule during the first week of classes.

Campus Resources for Students

Georgia Tech curates a Resource Guide for students at this link:
students.gatech.edu/student-resource-guide

This syllabus was last updated on Monday, April 13, 2026