

BIOL 4590: Research Project Lab Syllabus

Section A, Fall 2014 (3 credit hours)

Lecture: Cherry Emerson 322, Monday, 12:05 – 12:55 pm

Lab: Cherry Emerson A105, Monday, 1:05 – 3:55 pm and Friday, 12:05 – 2:55 pm

Instructor:

Prof. Patrick McGrath

patrick.mcgrath@biology.gatech.edu

Office: G205 Molecular Sciences and Engineering Building

Teaching assistant:

Wen Xu

wenxu@gatech.edu

Office: 1132 Molecular Sciences and Engineering Building

Course description: Students will gain experience in designing, implementing, and communicating a biology research project, and practical training in modern approaches for biological research. This section will have a scientific theme of studying the genetics of individuality using *C. elegans* as a model organism.

BIOL 4590 is a 3-credit lab-based course. BIOL 4450 (Senior Seminar) is a co-requisite for BIOL 4590 because students will present their research from BIOL 4590 in Senior Seminar. Students enrolled in BIOL 4590 can sign up for any section of BIOL 4450 as long as it occurs during the same semester.

Because this is a lab-based course, attendance and active participation are required. We expect absences to be rare, and each unexcused lab absence will lower your final grade by 5%. Examples of excusable absences include documented illness, death in the family, accident, and sanctioned Institute events. If you know that you are going to be absent from a lab, you must let the instructor know ahead of time. Unexcused absences from lecture sessions will lower the course participation grade.

Office hours: By appointment. Please email or consult with instructor or TA during class to set up a meeting.

Lab essentials: You will need to wear safety glasses, lab coats, long pants and closed-toe shoes whenever we're in a laboratory setting, and you'll need a new lab notebook (*not a spiral notebook or 3-ring binder*).

Optional text: Writing Papers in the Biological Sciences by Victoria E. McMillan (4th edition), Bedford/St.Martin's, Boston/NY, 2006. Approx. \$30.

Lab safety: Georgia Tech has a strict policy regarding appropriate clothing in laboratories where chemicals and organisms are used or manipulated. Students not conforming with the following requirements will be asked to leave the lab to acquire appropriate clothing. 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.

Evaluation is based on student research and the ability to communicate that research in writing and through oral presentations:

Research portion (evidence that research is being conducted effectively)	55%
Paper presentation – 10%	
Oral research proposal – 15%	
Research update – 10%	
Participation – 10%	
Lab notebook checks – 10%	
Scientific writing portion (evidence that student can communicate research)	45%
Written research proposal – 15%	
Preliminary manuscript – 10%	
Final manuscript – 20%	

Proposals consist of plans of the project to be conducted. If working in a group, each group of students will submit a single proposal for their project that is approved by all members of the group. The proposal (2 page single-spaced, 12-point font) should include: a title, introductory background and justification, hypotheses, experimental design, data analysis, statement of expected results, and how the results relate to the introduction. In addition, the proposal should cite the essential literature in-text, and include a journal-style literature cited section (not included in the page limit). DUE IN WEEK ~5

Preliminary manuscripts consist of the introduction and methods sections of the manuscript related to the student's research project, written in the style of the journal PLOS Genetics. The introduction should be no more than 2 pages (single-spaced, 12-point font) and should include the background, justification, and goals for the research project. Citations should be included in-text and listed at the end of the preliminary manuscript and are not included in the page limit. Feedback from the instructor can then be used to improve the introduction and methods for re-submission as part of the final manuscript. If students are working in groups, each student will write his or her own preliminary manuscript. DUE IN WEEK ~13

Final manuscripts are in the style of the journal PLOS Genetics and should be no more than 8 pages (single-spaced, 12-point font), plus figures, tables, and 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, as modeled in the journal. There is no limit on the number of citations used. Each student will write his or her own final manuscript. DUE AT BEGINNING OF LAST WEEK OF CLASS

Academic Integrity: Academic dishonesty will not be tolerated. This includes cheating, lying about course matters, plagiarism, 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. While students will collaborate in performing the experiments and collecting the data, each student is expected to write his or her own notebooks and manuscripts, including creating his or her 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 ask your instructor or TAs for help as you write before turning in your assignment.

Learning Accommodations: If needed, we will make classroom accommodations for students with disabilities. These accommodations must be arranged in advance and in accordance with the ADAPTS office (<http://www.adapts.gatech.edu>).

Week	Date	Topic	Reading assignment
1	Aug 18	Introduction to course, discussion on expectations for class, introduction to model organism, introduction to topic; potential topics	
	Aug 22	Growing and maintaining <i>C. elegans</i>	
2	Aug 25	Lecture; Wormbase; Identifying mutant phenotypes; Wormbase	
	Aug 29	Planning experiments;	
3	Sept 1	No class – Labor Day	
	Sept 5	Planning experiments	
4	Sept 8	Example research proposal; Planning experiments	
	Sept 12	Planning experiments	
5	Sept 15	Research proposal #1; Research proposal #2	
	Sept 19	Independent projects <i>Written report for planned experiment due in class</i>	
6	Sept 22	Research proposal #3; Research proposal #4	
	Sept 26	Independent projects	
7	Sept 29	Research proposal #5; Example journal club	
	Oct 3	Independent projects	
8	Oct 6	Journal club #1; Journal club #2; Independent projects	
	Oct 10	Independent projects	
9	Oct 13	Journal club #3; Journal club #4; Independent projects	
	Oct 17	Independent projects	
10	Oct 20	Journal club #5; Independent projects	
	Oct 24	Independent projects	
11	Oct 27	Example research update; Independent projects	
	Oct 31	No class (spring break)	
12	Nov 3	Research update #1; Research update #2; Independent projects	
	Nov 7	Independent projects	
13	Nov 10	Research update #3; Research update #4; Independent projects	
	Nov 14	Independent projects <i>Draft of results section of manuscript due in class</i>	
14	Nov 17	Research update #5; Independent projects	
	Nov 21	Independent projects	
15	Nov 24	Discussion of issues related to final manuscript; Independent projects	
	Nov 28	No class – Thanksgiving Break	
16	Dec 1	Joint poster session for all sections of BIOL 4450 TBD	
	Dec 5	Clean up lab <i>Final manuscripts due in class</i>	