

School of Biological Sciences, Georgia Institute of Technology

BIOS 2601: Genetics Laboratory Syllabus

Spring 2022

Sections: BIOS 2601 A1 (12:30 - 3:15 PM, Tuesday)

BIOS 2601 A2 (3:30 - 6:15 PM, Tuesday)

BIOS 2601 A3 (12:30 - 3:15 PM, Wednesday)

Classroom: 1-69 Boggs (located on the first floor of the Boggs Building)

Co-requisite: BIOS 2600

Instructor:

Dr. Mirjana Milosevic Brockett

Email: mirjana.brockett@biology.gatech.edu

Office location: Cherry Emerson 323

Teaching Assistants:

Katya Garcia (GTA)

Email: kgarcia40@gatech.edu

Ashlesha Gogate (GTA)

Email: agogate8@gatech.edu

Yi-Ming Chen (GTA)

Email: jacobymchen@gatech.edu

Lab Coordinator:

Alison Onstine, MSci.

Email: alison.onstine@biology.gatech.edu

Course Description:

This course is based around a term long project that will explore aspects of molecular genetics, evolution, bioengineering, and heredity using fluorescent proteins in a microbial model system. Through this process students will explore important genetics concepts and implement techniques commonly used to generate new knowledge in the field. We will also explore relevant published literature and practice scientific writing in both lab notebook and lab report form. We

Dr. Mirjana Milosevic Brockett

School of Biological Sciences, Georgia Institute of Technology

will discuss the scientific method and its application to genetics principles. This course is intended to accompany and co-required with BIOL 2600 lecture class.

By the end of this course, you will be able to:

- 1) Generate genetics hypotheses using your fluorescent protein experiment.
- 2) Design experiments and interpret results using basic statistical analysis.
- 3) Create and troubleshoot genetics lab protocols.
- 4) Cite relevant genetics primary literature.
- 5) Write effective and accurate notebook entries, and lab reports in the style accepted by genetics scientific journals.
- 6) Use appropriate lab safety standards and precautions.

While this laboratory is the co-required companion to BIOS 2600, your grade in each course is independently earned. This course is 1.0 credit hour. You are expected to work for 2.4 full hours in lab each week, and for the additional time required to complete your lab prep and assignments.

Schedule: Genetics Lab meets every Tuesday and Wednesday from January 18 and 19, through April 19 and 20 (except for the Spring break week). Full assignment details and due dates are in the schedule below. Because of the project-based nature of this course, there is a strong possibility that the schedule will need to be revised week by week based on the progress made each week. Expect a small quiz or reading assignment each week; the schedule contains the probable quizzes or writing assignments. As for all due dates, some may need to be adjusted to stay aligned with our lab progress.

Required Textbooks and materials:

- Text: Same as for lecture; the textbook is a useful reference for many lab protocols
- Lab Manual: There is no lab manual for purchase for this course. Instead handouts and materials will be provided as needed in lab and/or on the Canvas website.
- Notebook: Student Lab Notebook (available at the Bookstore), bring to class each week.
- Safety: Lab coat (see 'Lab Safety' below for details)
- Other: Close-toed shoes and long pants are **required** for every lab; calculators and laptops (one per group) are useful.

Lab Safety:

Georgia Tech has a strict and strictly enforced 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** and may not return without appropriate clothing:

1. **Long pants** must be worn in the laboratory.
2. **Close-toed shoes** that cover the sides and top of the foot must be worn in the laboratory.

School of Biological Sciences, Georgia Institute of Technology

3. **Lab coats** must be worn when working at the bench. Students are responsible for keeping their lab coats in good condition and reasonably clean so as not to create a hazard. Lab coats must be 100% cotton and cover the wearer to the knees. You can purchase lab coat in the GT Bookstore
4. **Safety glasses** must be worn 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. Safety glasses will be made available for your use in the lab.
5. **Face coverings Safety in Lab** and COVID-19. Your safety in our lab sessions is our number one priority, while still providing a productive learning environment. To that end while in lab all students will be required to wear all appropriate PPE. This includes masks, goggles, lab coats, and gloves. Students will be responsible for their own lab coats and goggles while Bio labs will supply gloves and disposable face-masks for in-lab use (you still must have your own face-mask for the rest of your time in the Boggs building).

The laboratory safety policies exist to keep you safe and in compliance with federal regulations while working with biological materials. Details will be available in detail on January 18 and 19, on the first day of labs, and each student will be required to sign a safety agreement.

Evaluation:

Grades will be calculated on the following scale:

A: $\geq 90.0\%$
B: $\geq 80.0\%$ and $< 90.0\%$
C: $\geq 70.0\%$ and $< 80.0\%$
D: $\geq 60.0\%$ and $< 70.0\%$
F: $< 60.0\%$

Points will be based on the following:

Pre-Lab Assessments (~5)	35%
Lab Notebooks	10%
Lab Report Drafts	15%
Participation	10%
<u>Final Lab Report</u>	<u>30%</u>
Total	100%

Attendance: Given that you are working with others to perform experiments and collect data on an on-going project, there is no mechanism to “make-up” a lab. If you must miss a laboratory, notify the TA's and instructor by email as soon as possible, preferably before the missed lab. Vacation, work commitments, and social events are not acceptable reasons to miss lab. Examples of legitimate reasons to miss a lab include serious illness, illness or death in your immediate family, and participation in official university activities. You will be required to provide documentation for excused absences. Unexcused absences will result in a 10% reduction in your final course grade; you will not be permitted to make up work missed in lab. Persistent tardiness may result in loss of points from your participation grade.

Pre-lab assessments will be available on Canvas on Friday evening, before each lab. Pre-labs concentrate on the upcoming lab material and are due by 11:55am the day of lab (Tuesday or Wednesday). **Late submissions will not be accepted.** If you miss a pre-lab, you will receive a zero for that pre-lab. You should plan to complete the assigned reading before attempting the pre-lab. Pre-labs are open-book but individual, non-collaborative assignments.

Lab Notebook: You are required to bring your lab notebook each week. This course *recommends* a Life Sciences Student Lab Notebook with Spiral Binding or some similar book. If you have a different lab notebook, please check with your TA. Towards the end of the semester, you will submit your original notebook for grading on content, legibility, and thoroughness. A thorough lab notebook will be critical to writing accurate lab reports. In your notebook, you must write in your own words, even if you are working with a partner or group on the experiment. A lab notebook rubric will be provided on Canvas.

Tip: For each *experiment* that we address, your notebook should include an introduction to the experiment, explanations of the methods used (detailed enough that you could repeat a year from now), reasons for conducting specific methods, results of experiments you complete, explanation of analyses, and summaries of conclusions. Your notebook should describe the beginning, middle, and end of each experiment—it's rare to set-up and analyze an experiment in the same day, so experiments are likely to span multiple weeks if not the entire semester.

Lab Report: During the semester, you will generate a full laboratory report in the style of a scientific journal. This report will be written in stages; each stage will receive peer and/or instructor feedback. All lab reports are individual assignments. While lab work is done collaboratively, every component of the lab report, except shared tables and figures (see notebooks above), should be generated by the report's author. There will be several writing assignments due during the semester to encourage you to test your ideas in writing. Each will be submitted electronically to Canvas; each assignment will be announced the week prior and will be due by the beginning of lab. A late assignment will be reduced one letter grade (10%) for each 24-hour period that it is late. **Final Lab Report Due on/before April 29, 2022.**

For notebooks and reports, 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.

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 notebook entries and lab write-ups. **Plagiarism** includes reprinting the words of others without both the use of quotation marks and citation. As direct quotes are seldom used in scientific writing, you are expected to rephrase the words of others and provide the citation. Any suspicion of academic misconduct will be sub-

School of Biological Sciences, Georgia Institute of Technology

mitted to the Office of Student Integrity for adjudication; please consult with us before you submit rather than run the risk of an academic misconduct infraction.

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 Office of Disability Services (disabilityservices.gatech.edu).

Office Hours: To meet students' requirements, needs, and comfort levels, meetings and office hours will be offered weekly, either in-person, virtually, or outdoors. The TA's will offer weekly "open office hour" at times that their schedule allows and will be posted on Canvas later in January.

Other information: Dean of Students Office, CARE Center, Counseling Center, Stamps Health Services, and the Student Center: The [CARE Center](#) and the [Counseling Center](#), Stamps Health Services, and the Dean of Students Office will offer both in-person and virtual appointments. Student Center services and operations are available on the [Student Center](#) website. For more information on these and other student services, contact the Dean of Students or the [Division of Student Life](#).

CALENDAR:

1	Jan 11	First Week - No lab
2	Jan 18	Safety / Introduction / Micropipette exercise
3	Jan 25	Plasmid DNA extraction, Mutagenic PCR
4	Feb 1	PCR clean up, Double digestion
5	Feb 8	PCR clean up, Ligation
6	Feb 15	Gel electrophoresis
7	Feb 22	Transformations
8	Mar 1	Transformations II, Assay transformants, streak colonies
9	Mar 8	Colony PCR, Fluorescent Assay set up
10	Mar 15	Gel electrophoresis, Fluorescent Assay set up
11	Mar 22	Spring Break
12	Mar 29	Sequence Results, Fluorescent Assay Results
13	April 5	Phylogenetic analysis
14	April 12	Flexible
15	April 19	Flexible
16	April 26	Final Instruction Days - No Lab

[This syllabus is subject to change.](#)