**BIOS 2601: Genetics Laboratory – Syllabus – Fall 2018**

**Sections**: Section A (84932) on Monday 12:10-2:50 or Section C (84933) Monday 3:05-5:45

**Classroom**: CE 123 (located on the ground floor of Cherry Emerson in the SW corner)

**Prerequisite:** BIOS 1107 AND (BIOS 1107L OR BIOS 1207L) OR BIOL 1510 OR BIOL 1511

**Co-requisite**: BIOS 2600 co-requisite.

**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 will discuss the scientific method and its application to genetics principles. This course is intended to accompany and co-required with BIOL 2344 lecture class.

**Course Objectives**

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 BIOL 2344, 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.

**Instructor**:

Dr. Mirjana Brockett

Email: [mirjana.brockett@biology.gatech.edu](mailto:mirjana.brockett@biology.gatech.edu)

Office location: Cherry Emerson 323

Office Hours: TBD

Phone: 404 385 6885

**Teaching Assistants**:

Carl Dyson

Email: cdyson3@gatech.edu

Office hours location: Cherry Emerson 128

Office Hours: TBD

Kwantae Kim

Email: quantae@gatech.edu

Office hours location: TBD

Office Hours: TBD

**Lab Coordinators:**

Alison Onstine, MSci.

Angelique Lessard, MSci.

**Schedule:** Genetics Lab meets every Monday from 8/27 through 11/26 except: 9/3 (Labor Day) and 10/8 (fall break). An assignment will be due on Monday 12/3, during the last full week of classes, and the final lab notebook is due during exams 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 writing or reading assignment each week; the schedule contains the probable writing assignments and due dates, but those too may need to be adjusted to stay aligned with our lab progress. Consult the dynamic weekly schedule on the course website, [bio2355.biosci.gatech.edu](file:///C:\Users\mb402\AppData\Local\Packages\Microsoft.MicrosoftEdge_8wekyb3d8bbwe\TempState\Downloads\bio2355.biosci.gatech.edu), for the most current lab work plans and assignment due dates.

**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 course website, [bio2355.biosci.gatech.edu](file:///C:\Users\mb402\AppData\Local\Packages\Microsoft.MicrosoftEdge_8wekyb3d8bbwe\TempState\Downloads\bio2355.biosci.gatech.edu).

Notebook: Life Sciences 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 held in CE123 (wet labs); 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.
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.
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.

The laboratory safety policies (see last page of the syllabus) exist to keep you safe and in compliance with federal regulations while working with biological materials. Details will be discussed in detail on the first day of lab and each student will be required to sign a safety agreement.

**Grading Criteria:**

Grades will be calculated on the following scale:

A: ≥ 90.0%

B: ≥ 80.0% and < 90.0%

C: ≥ 70.0% and < 80.0%

D: ≥ 60.0% and < 70.0%

F: < 60.0%

Points will be based on the following:

Participation 5%

Pre-Lab Assessments (~5) 15%

Lab Notebooks 20%

Lab Write-ups 30%

Final Lab report 30%

**Attendance and Participation:** 100% attendance is expected for each lab, and for the entire lab period. 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 instructor by email (or phone) as soon as possible, preferably before the missed lab. There will be no make-up laboratories. 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.

Genetics Lab requires cooperative use of materials, awareness of lab safety protocols, preparedness before class, and effective interaction in class. On time arrival is essential for a lab project to run smoothly. Each class period, we will assess your participation in class. Student use of a cell phone for non-lab business during lab may result in 0 participation points for that lab period. If you are in a situation where you must leave your phone on, please alert the instructor ahead of time and step outside to take the call. You are encouraged to check in with the course TAs at any time during the semester to gauge your participation score to date.

Please also see http://www.catalog.gatech.edu/rules/4/ for more information about institute expectations and restrictions around attendance, including information about excused absence

**Additional criteria for successful completion of the course**

**Pre-lab assessments** will be available on Canvas on the Tuesday before each lab. Pre-labs concentrate on the upcoming lab material and are due by 11:55pm on Sunday before each lab. Late submissions will not be accepted. If you miss a pre-lab due to an unexcused absence from 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. If you have extra pages from 1510/1520, then you may reuse that notebook. Your TA will provide periodic feedback, as necessary, regarding your lab notebook content. At two points during 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 particular 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—its 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 Write-ups:** 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 many writing assignments due during the semester to encourage you to test your ideas in writing. Each will be submitted electronically to Canvas *and in hard copy in lab*; each assignmentwill 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 November 26th.**

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 and Collaboration:** 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 submitted 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.

**Accommodations for Students with Disabilities:** 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](http://disabilityservices.gatech.edu)).

## Student-Faculty Expectations Agreement

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. See <http://www.catalog.gatech.edu/rules/22/> for an articulation of some basic expectation 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.

## Student Use of Mobile Devices in the Classroom

Lecture is a time when we all work together, so be courteous to your fellow students and do not disrupt class by entering and leaving the room, reading, talking, allowing cell phones to ring, etc. In addition, do not use your electronic devices (laptops, tablets, smartphones, etc.) for non-class use.

**CALENDAR:**

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| --- | --- | --- |
| 1 | Aug 20 | *No lab* |
| 2 | Aug 27 | Safety / Introduction and Micropipette exercise |
| 3 | Sept 3 | *Labor Day* |
| 4 | Sept 10 | Plasmid DNA extraction, Mutagenic PCR |
| 5 | Sept 17 | PCR clean up, Double digestion |
| 6 | Sept 24 | Gel electrophoresis, Ligation |
| 7 | Oct 1 | Transformations |
| 8 | Oct 8 | *Fall Break* |
| 9 | Oct 15 | Assay transformants, streak single colonies |
| 10 | Oct 22 | Colony PCR, Fluorescent Assay set up |
| 11 | Oct 29 | Gel electrophoresis, Sequencing, Fluorescent Assay results |
| 12 | Nov 5 | Sequence analysis |
| 13 | Nov 12 | Phylogenetic analysis |
| 14 | Nov 19 | Flexible |
| 15 | Nov 26 | Flexible |
| 16 | Dec 3 | *Final Instruction Days* |

**Lab Schedule (Subject to change, including assignment due dates)**