

BIOL 2355: Honors Genetics Laboratory (Fall 2014) – Syllabus

Sections: HP1 Thursday 12:05-2:55 or HP2 Thursday 3:05-5:55

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

Co-requisite: BIOL 2354 & BIOL 2355 are co-requisites. You must take both courses simultaneously.

Course Description:

This course is designed for exceptional students interested in learning important concepts and practical techniques in the field of genetics. This lab is project-based, where students will design and conduct a laboratory experiment aimed at exploring aspects of transmission genetics, population genetics, and molecular genetics using the Georgia Tech Urban Honey Bee Project and neighboring hives. As with all research, we will begin with a question and then follow the scientific method to generate a hypothesis, design and conduct an experiment, and analyze the data to draw a conclusion. Because we'll be exploring new questions to Atlanta's urban honey bee populations, we'll probably also bump into the primary frustrations of scientific research—assays that require troubleshooting, delays when protocols don't work perfectly at first pass, and results that don't match our thinking about the system. We'll do this because asking real questions in a relevant study system is what scientists do, and learning how to navigate the process and solve the ensuing problems is the best training you can have for your senior research experience and to pursue careers in scientific research, medicine & human health, or other fields that requires problem solving and logic.

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

- 1) Generate genetics hypotheses using the European Honey Bee.
- 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 2354, your grade in each course is independently earned. This course is 1.0 credit hour. You are expected to work for 3 full hours in lab each week, and for the additional time required to complete your lab prep and assignments.

Instructor: Dr. Chrissy Spencer

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Office location: CULC 474D

Office Hours: Tuesdays 12-1:30 pm

Phone: 404 385 0539

TA: Amanda Ballard

Email: aballard7@gatech.edu

Office location: CE 211

Office Hours: Monday 12:30-2:30

Required Textbooks and materials:

Text: Brooker (2015) Genetics Analysis & Principles (5th e) McGraw-Hill Educ. (same as for lecture)

Lab Manual: There is no lab manual for purchase for this course. Instead handouts will be provided in lab.

Notebook: You must take notes during lab, and you may use any format you find effective. After lab, your notes will be transferred and formalized into an electronic lab notebook, your formal lab notebook for this course.

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.

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:

Participation	10%
Pre-Lab Assessments (~5)	10%
Lab Notebooks	20%
Lab Write-ups	45%
Group Presentation	15%

Attendance: 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.

Pre-lab assessments will be available on t2/“Pre-labs” on the Tuesday before each lab. Pre-labs concentrate on the upcoming lab material and are due by 11:55 pm on the Wednesday 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: Your lab notebook will be maintained electronically. For each major question that we address, your notebook should include an introduction to the experiment, explanations of the methods we 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. Lab notebooks should be updated **within 24 hours of lab** and will be monitored and commented on regularly, and graded periodically. Your notebook will be graded on content, accuracy, and completeness according to the rubric in the lab manual. A thorough lab notebook will be fundamental to write accurate lab write-ups. In your notebook, **you are to write in your own words**, even if you are working with a team on the experiment.

The only exceptions to this are:

- team-devised protocols,
- data, which should be proofread carefully, and
- tables and figures. These may be shared within your team but should be critically examined for accuracy.

If a teammate made a mistake that you preserve in your notebook and work, you become responsible for that error as well. Therefore, data entry and analysis are best done collaboratively, with proofreading, rather than by one member of the team. Anything you write in your lab notebook may be used word-for-word in your lab report. The lab notebook rubric is posted to t2/Resources.

Lab Write-ups: 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), 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 t2/Assignments and is due by the beginning of lab on the dates indicated. Many will also require you to bring a hard copy. An exact schedule of assignments, formats, and due dates is shown below in the schedule. A late assignment will be reduced one letter grade (10%) for each 24-hour period that it is late.

For notebooks and reports, you may want or need to set up an appointment for interactive writing assistance from tutors in the Communication Center (www.communicationcenter.gatech.edu) in the CULC.

Participation: Genetics Lab requires cooperative use of materials, awareness of lab safety protocols, preparedness before class, and effective interaction in class. Each class period, we will assess your participation in class, for a total of 15% of the course grade. Student use of a cell phone 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 instructors at any time during the semester to gauge your participation score to date.

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) will be discussed in detail on the first day of lab.

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. If this is unclear, please ask instructors for help as you work on an 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 Office of Disability Services (<http://www.adapts.gatech.edu>).

Schedule and Due dates (This schedule will likely change as the project develops. The most current version will always be at this link: bio2345.biology.gatech.edu/bee-project-f14-schedule/)

8/21 – WEEK 1

- Basic bee biology & tour the bees
- How to read a scientific paper
- In-lab Reading: Mattila & Seeley 2007 Science
- For next week:
 - Read Seeley & Tarpay 2007 Proc Roy Soc B
 - Watch this video on [Micropipetting](#) (you will need to be logged in to your account)

8/28 – WEEK 2

- Before lab, answer the questions on the Pre-lab.
- Honey-bee genetics overview
- Lab Safety
- Pipetting skills
- Reading for Next Week: Based on today's conversation, we'll select and post a reading and questions by Monday.

9/4 – WEEK 3

- Before lab, answer the reading questions on the Pre-lab.
- Lab Safety Review
- Project Planning – Finding a Question and a Hypothesis
- Set up your lab notebook at <http://bio2345.biology.gatech.edu/> (instructions in class)
- Update lab notebook by Friday

9/11 – WEEK 4

- Before lab, answer the reading questions on the Pre-lab.
- Project Planning – Design an Experiment
- Update lab notebook by Friday
- **Due: Writing Assignment – Write your hypothesis and experimental design using words and diagrams**

9/18 – WEEK 5

- Before lab, answer the reading questions on the Pre-lab.
- Project Planning – Protocols for experiment
- Update lab notebook by Friday

9/25 – WEEK 6

- Before lab, answer the reading questions on the Pre-lab.
- Project work continues
- Update lab notebook by Friday
- **Due: Writing Assignment – Convert a published methodology into a step by step protocol**

10/2 – WEEK 7

- Before lab, answer the reading questions on the Pre-lab.
- Project work continues

- Update lab notebook by Friday
- [Due: Writing Assignment TBA](#)

10/9 – WEEK 8

- Before lab, answer the reading questions on the Pre-lab.
- Project work continues
- Update lab notebook by Friday

10/16 – WEEK 9

- Before lab, answer the reading questions on the Pre-lab.
- Project work continues
- Update lab notebook by Friday
- [Due: Writing Assignment TBA](#)

10/23 – WEEK 10

- Before lab, answer the reading questions on the Pre-lab.
- Project work continues
- Update lab notebook by Friday
- [Due: Writing Assignment TBA](#)

10/30 – WEEK 11

- Before lab, answer the reading questions on the Pre-lab.
- Project work continues
- Update lab notebook by Friday
- [Due: Writing Assignment TBA](#)

11/6 – WEEK 12

- Before lab, answer the reading questions on the Pre-lab.
- Project work continues
- Update lab notebook by Friday
- [Due: Writing Assignment TBA](#)

11/13 – WEEK 13

- Before lab, answer the reading questions on the Pre-lab.
- Project work wraps-up
- Update lab notebook by Friday

11/20 – WEEK 14 – bring computers to class

- [Due: Draft of Paper – bring TWO paper copies \(stapled\) and upload to t2](#)
- [Peer-review](#)
- [Create powerpoint presentation and present to class](#)
- [Discussion & Wrap-up](#)

11/27 – THANKSGIVING HOLIDAY

12/04 – WEEK 15 – No class meeting

- [Due: Final Paper](#)