

Honors BIO 167: Skills of Biological Investigation

2 credits

Syllabus: Fall 2017

Instructor: Susan Riechert: TA- Angela Chuang

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*Allow 24-48 hours for response

Office Hours: After class (Wednesday, 5:30-6; Thursday 5-5:30) or preferably by appointment

Course Learning Goal:

This course is designed for you to practice the skills necessary to conduct scientific research. Scientists read about the work of other scientists, formulate ideas and questions for their own experiments, conduct experiments, come to conclusions, present their results, and continue the process over again. This course will explore how scientists conduct and report their work and students will put these principles into practice in laboratory each week.

Course Learning Objectives:

By the end of the course, you should demonstrate proficiency in the following *scientific practices*:

1. Distinguish between, and develop your own, scientifically-appropriate hypotheses and predictions.
2. Find and use scientific literature to frame your experimental designs.
3. Organize, analyze, and interpret scientific data.
4. Communicate your scientific results in written and verbal forms (including the creation of figures and tables).
5. Design and carry out your own scientific investigation.

Catalog description:

Intended for science majors, this course offers an exploration of the skills necessary to conduct research in biology. Emphasis will be on reading primary literature, designing and carrying out experiments, summarizing and analyzing data, coming to conclusions from data, and presenting investigations in oral and written forms. These skills will be gained through the completion of a semester-long group research study.

Lab policies and safety regulations **MUST** be followed at all times – no exceptions. Violation will result in a **loss of lab points**, or dismissal from the lab and/or course.

Lab Policies:

- Use of cell phones, laptops, smartphones, and other devices is prohibited unless specifically given permission for their use by your instructor
- Personal items should be stowed away and not placed on the lab bench
- You must clean and dispose of laboratory materials as directed by your instructor before leaving.

Lab Safety:

- There will be **NO** tobacco or nicotine products used in the lab at any time.

Class Policies:

- Check your laboratory Canvas site because this is what I will use to send you information about lab.
- You should expect to be in class for the full duration.
- Be on time and respectful to everyone in the course, including fellow classmates and the instructor.

ACADEMIC MATTERS

Academic dishonesty of any sort will not be tolerated. Students should refer to Hilltopics for University policies and procedures regarding these instances. You are expected to abide by The University of Tennessee honor statement in all of your university activities.

"An essential feature of The University of Tennessee is a commitment to maintaining an atmosphere of intellectual integrity and academic honesty. As a student of the University, I pledge that I will neither knowingly give nor receive any inappropriate assistance in academic work, thus affirming my own personal commitment to honor and integrity." (Hilltopics, the UT Student Handbook)

Copying sentences, portions of sentences, or re-phrasing sentences in the same order as anyone else's work (a web source, article or another student) will all be flagged as plagiarism by the University's plagiarism software. **You may discuss your labs with other students, but write your lab communications on your own.** Your final manuscript will be submitted through "SafeAssign" and plagiarism will not be tolerated. It is expected that all students attending lab will conduct themselves in a manner that is both respectful and accommodating to their laboratory instructors and to their lab partners/fellow students. Rude and disruptive behavior cannot be tolerated and will result in the dismissal of the student from the lab period and possibly the course.

Final Grades

Final letter grades will be determined by the total percentage of 500 points accumulated as follows:

A	93 – 100%	C	73 – 76%
A-	90 – 92%	C-	70 – 72%
B+	87 – 89%	D+	67 – 69%
B	83 – 86%	D	63 – 66%
B-	80 – 82%	D-	60 – 62%
C+	77 – 79%	F	<60%

Week Of	Activities and Topics Covered	Homework (due the following week)
Aug. 28-Sept. 1	Introduction to lab, introduction to science, pre-test, black box activity, intro to probability, literature search methods; potential research topics	Introductory survey, learning type survey (optional), 2 abstracts of potential research from a literature search
Sept. 4-8	Developing testable hypotheses, post-test, hypotheses and experimental design, variation, biodiversity metrics, research topics	List of 5 possible research questions and materials list
Sept. 11-15	Experimental design trials (meet in field), narrow hypothesis and research methods in teams, generate materials list	Annotated bibliography for report (3 primary sources)
Sept. 18-22	Field work preparation, sample adequacy, power analysis, finalize experimental design procedure	Question, Hypothesis, Prediction, Experimental design; Install JMP
Sept. 25-29	Field Work: Data collection (meet in field)	Data entry and organization, peer evaluation 1
Oct. 2-6	Fall break, no classes	
Oct. 9-13	Group meetings; Begin Introduction to Statistical Theory and Analysis; begin practice in JMP	Stats Homework
Oct. 16-20	Field Work: Data collection (meet in field)	Data entry and organization
Oct. 23-27	Field Work: Final data collection (meet in field)	Peer evaluation 2
Oct. 30-Nov. 3	Statistical Analysis in JMP; Graphs, Figures and Tables and Interpretation of Data analysis; Begin analyzing data if enough time	Bring 2 copies of manuscript draft
Nov. 6-10	Analyze data; group meetings; how to prepare a good poster; how to peer review	Your data analysis w/interpretation
Nov. 13-17	Group meetings for poster prep (meet outside of class)	Group poster, peer review
Nov. 20-24	Thanksgiving Break, no lab	
Nov. 27-Dec. 1	Poster conference	Peer evaluation 3, final manuscript
Dec. 4-8	Skills exam	

Points distribution* for Bio 167

Total points = 500

Individual Assignments = 350 points

Pre-test	5
Google Form Survey	5
Post-test	15
Abstracts	10
Potential research questions	5
Annotated bibliography	20
Ques., hyp., exp. design	25
Statistics Homework	20
Hyp, Exp des & analysis	20
Data analysis w/Interpretation	25
Draft Manuscript	30
Final Manuscript	100
Peer review	20
Peer Evaluation 1	20
Peer Evaluation 2	20
Peer Evaluation 3	20

Group assignments = 50 points

Poster	50
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Exams and quizzes= 100 points

Quizzes** (5 pts x 10)	50
Skills exam	50

* Subject to change if necessary!

**Quizzes will occur in multiple forms, including pop quizzes, take-home, open-note, group, individual, etc. The form may be randomly chosen and differ between both lab sections on a weekly basis.