

**BIOLOGY 4194 – ENTERING INDEPENDENT RESEARCH
3 CREDIT HOURS
SPRING 2013 - CALL # 22480**

TENTATIVE SYLLABUS

Lecture: Tuesday 12:45-2:05 pm – Jennings Hall 160

Recitation: Thursday 12:45-2:05 pm – Jennings Hall 160

Instructor: Dr. Zeynep Benderlioglu

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Office Hours: By appointment

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Textbooks: Selected on-line book chapters can be purchased through the publishers' web site:

1. *Statistics for the Behavioral Sciences*, 2nd ed. 2010, Nolan SA, Heinzen TE, Worth., ISBN-13: 978-1-4292-3265-4 Web link:

<http://worthpublishers.com/Catalog/product/statisticsforthebehavioralsciences-secondedition-nolan/formatsandpackages/studentpurchaseoptions>

Chp2 & Chps 6-16.

2. *Research Methods*, 8th ed. 2010. McBurney & White, Wadsworth Publishers, ISBN-13: 9780495602194 Web link: <http://www.cengagebrain.com/shop/isbn/9780495602194>

Chps 2-8, Chps 11-14, & Appendix A

3. *Research Design and Methods: A Process Approach*, 8th ed. 2011. Bordens K, Abbott BB, ISBN-13: 978-0-07-353202-8 McGraw-Hill. Web link: <https://create.mcgraw-hill.com/shop/>

Chp 11 & Chp 16.

Statistics Textbook:

4. *Applied Statistics and the SAS Programming Language* 5th Edition (hard copy). 2006. Cody, R, Smith J. Pearson/Prentice Hall.

Course Description

This course is designed to equip students in the Natural and Mathematical Sciences with necessary skills to become independent researchers. The main emphasis is given to experimental methods. Live

arthropods are used in the classroom to help develop student research projects. Related topics will include experimental and quasi-experimental design, hypothesis testing, sampling, and research ethics. Basic statistics, data analysis using SAS statistical software, as well as Power Point, and Excel graphing tools for presentation of data will also be given throughout the course. As research funding is an essential part of conducting experimental studies, students will be guided through the process of grant writing. Dissemination of knowledge is an integral part of the scientific inquiry. Accordingly, an outreach program is also implemented in this course. Students will be participating in service learning designed for local grade schools. They engage grade students in hands-on activities, and conduct experiments with arthropods.

Learning Objectives:

- a. Students will learn basic principles of experimental research
- b. Students will be able to design their own projects, lay out an implementation plan, and apply for funding
- c. Students will be able to use statistics and data analyses tools for their proposed study
- d. Students will gain necessary communication and critical thinking skills for scientific inquiry
- e. Students will gain a greater understanding of animal diversity and address broader implications of a research question

Course Website: <https://carmen.osu.edu/>

The address printed here will bring you to the login page for Carmen. If you are unfamiliar with CARMEN, instructions are available at the Center for Life Sciences Education office (260 Jennings Hall).

Electronic Communication: Students are welcome and encouraged to e-mail the instructor. Course updates and other course related communication will be posted on CARMEN and will be distributed as a course-wide email to all name.#'s registered for the course. It is expected that all students will check their e-mail and CARMEN web site regularly for updates, lecture notes, hands-out and assignments.

Evaluation

There will be seven homework assignments throughout the Semester. The students will also engage in outreach activities for local grade schools. In addition, each student will orally present a research proposal in class. As the Semester progresses, students will develop their proposals into fully written grants for potential funding. A week from an assignment's due date, a handout on how to complete the assignment will be posted on Carmen. These guidelines should be followed closely as they constitute what your homework should cover and what sources you should be using. The grades will be assessed according to the following scheme:

1. Outreach (10 points total).

- a. Presentations/engagement in hands-on activities with grade schools **(5 points)**.

Important Note: You can NOT earn this credit if you did not complete signature animal factsheet below.

- b. Signature animal factsheet for outreach activities **(5 points)**.

Important Note: You can NOT earn this credit if you are not present in outreach activities involving local schools [see item a) above].

2. *Homework assignment # 1: Research Databases and Literature Review (5 points)*
3. *Homework assignment # 2: Article Examination (5 points)*
4. *Homework assignment # 3: Design an Experiment (10 points)*
5. *Homework assignment # 4: Budget Proposal (5 points)*
6. *Homework assignment # 5: Statistics – Part I (5 points)*
7. *Homework assignment # 6: Statistics – Part II (5 points)*
8. *Homework assignment # 7: Graphs/Stats - Part III (5 points)*
9. *Oral Presentations (15 points)*
10. *Grant Proposal (20 points)*
11. *Attendance (includes class participation) (15 points)*

Total: 100 points

Grade Scale: Your final grade will be based on the following scale:

94-100	A
90-93	A-
87-89	B+
84-86	B
80-83	B-
77-79	C+
74-76	C
70-73	C-
67-69	D+
60-66	D
59 and below	E

There are no extra credits. However, minor adjustments may be made on the basis of improvement and/or participation. Course policies regarding the assignments are outlined below.

Course Policies

Late Assignments: It is extremely important that you follow the deadlines. If you were to apply for research money, the funding agencies would not accept your proposal after the due dates. Similarly, if you were scheduled to give a talk and did not show up on time, it will have important adverse consequences for your future career. In order to emphasize this point, I will not accept late assignments. Failure to deliver your proposal, or show up for your presentation will result in **0 points** for the subject assignment. If you were too ill to complete an assignment, you are required to contact me within 24 hours of the class period in which the assignment was due. You must provide written documentation

from a medical unit regarding the illness covering the assignment period. If you had other excuses that are personal in nature, I will consider those on an individual basis. I will reserve the right to decide what constitutes a “legitimate excuse.” Lack of transportation, travel to sports, or family events are NOT considered legitimate excuses. You are given ample time for preparing a proposal and flexibility in scheduling your presentation. Please plan accordingly.

Codes of Conduct in Class: This class involves interactive hands-on activities with laboratory animals, in-class discussions, and working with grade schools. Therefore, please consider the following:

- a. Be on time. Late arrivals and early departures are very disruptive, especially if you are visiting a school, or, someone is presenting in class.
- b. Be respectful of the animals you are working with. If you are uncomfortable with studying any of the animals, let the instructor know. You will NOT handle any animal that would sting or bite you under any circumstances.
- c. Turn off your cell phone, beeper, smartphone, and any other device that you text, or listen to. Use of such devices is strictly prohibited in class.
- d. Be patient with kids, respectful to teachers, and school property. Your job is to instill curiosity in young minds, NOT fear. Some kids will scream when you show the animals. Gently guide them to the interesting facts about the animals. Don't worry if you are uncomfortable yourself. Your instructor, or, a designated person will be supervising the activities and doing the handling, if necessary.

Class participation: Attendance and participation in class and recitation hours are essential to succeed in this course. There are no exams. Accordingly, through participation, hands-on training with laboratory animals, observation of your peers presenting in class, critiquing scientific work, and listening to guest speakers will equip you to become independent researchers in your own right. To emphasize this point attendance is worth 15 percent of the total grade. You can be absent for 2 class periods without any excuse and loss of points. Otherwise, the same policies apply regarding late class assignments.

Grade Inquiries: Grades will be posted to the course site on Carmen. You will have 14 days from the date the grade is posted to challenge any grade or inquire about a missing grade; after that time the grade becomes final, no exceptions.

Miscellaneous items:

Food and drink: Food and drink are strictly prohibited in the laboratory

Cell phones: All electronic devices must be turned off during class. No calls, no texts, no earpieces are allowed, and please keep the web-surfing to a minimum if you use your laptop for notes.

University Policies

Students with Disabilities: If you have any special needs, you should meet with me within first week of class to arrange for provisions to ensure an equitable opportunity to meet all requirements of this course. Accommodations require special approval by the Disability Services. Check the web site below for further information: <http://ods.osu.edu/>

Academic Integrity (Academic Misconduct):

Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students have read and understand the University's *Code of Student Conduct*, and that all students will complete all academic and scholarly assignments with fairness and honesty. Students must recognize that failure to follow the rules and guidelines established in the University's *Code of Student Conduct* and this syllabus may constitute "Academic Misconduct."

The Ohio State University's *Code of Student Conduct* (Section 3335-23-04) defines academic misconduct as: "Any activity that tends to compromise the academic integrity of the University, or subvert the educational process." Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination.

If I, or any other instructor, suspect that a student has committed academic misconduct in this course, I am obligated by University Rules to report my suspicions to the Committee on Academic Misconduct. If the COAM determines that you have violated the University's *Code of Student Conduct* (i.e., committed academic misconduct), the sanctions for the misconduct could include, and are not limited to, a failing grade in this course and suspension or dismissal from the University.

If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact me. If you have any general questions concerning academic integrity, please refer to the following web site: <http://oaa.osu.edu/coam.htm>

Sexual Harrassment: While your instructor has been trained in OSU sexual harassment policies and procedures, this may not be true for staff and is not generally true for OSU students. Please report any concerns about questionable or unwanted behavior that has the purpose or effect of unreasonably interfering with an individual's work or academic performance, or creates an intimidating, hostile, or offensive environment for working, learning, or living on campus to your course instructor or the Office of the Dean.

University Escort Service: To promote safety on campus, transportation across campus is offered by the OSU Department of Public Safety. Service is available between 7:30pm and 2:40am. Call 292-3322 to schedule a pick-up. You must provide at least one hour notice. See the web link below for further information. http://dps.osu.edu/emergency_procedures/index.php?level=14

Errors & Omissions: This syllabus may be altered in the event that guest speaker, student and local school schedules change, and animal deliveries are not made on time by the vendor. Corrected versions will be posted on CARMEN.

Week	Date	Lecture	Assignments
1	T Jan 8	Introduction to Research Methods	
	R Jan 10	Discovery Time, Signature Animals, Introduction to Outreach Programs	
2	T Jan 15	Research Methods Cont'd, Validity , Confounds, Reliability, Sampling	
	R Jan 17	Experimental, Quasi-Experimental Designs, Randomization, Hypothesis Testing, Independent and Dependent Variables	Signature Animal Factsheet Due (Outreach engagement will be announced later based on student schedules)
3	T Jan 22	Controlling the Confounds	
	R Jan 24	Non-experimental Designs	
4	T Jan 29	Deductive and Inductive Reasoning: Termite Behavior	
	R Jan 31	Research Databases, Literature Review	Article Examination Due
5	T Feb 5	Green House Visit	
	R Feb 7	Research Ethics	Literature Review Assignment Due
6	T Feb 12	Design an Experiment	Outreach Local School Visit 6-8 pm
	R Feb 14	Power Point Tools for Oral Presentations	
7	T Feb 19	Descriptive Statistics: Frequency Tables, Distributions, Central Tendency	Design an Experiment Due
	R Feb 21	Intro to SAS	
8	T Feb 26	Student Presentations	
	R Feb 28	Student Presentations	
9	T Mar 5	Student Presentations	
	R Mar 7	Inferential Statistics, Review of Hypothesis Testing, Meaning of p	
10	T Mar 12	No Class – Spring Break	
	R Mar 14	No Class – Spring Break	
11	T Mar 19	Guest Speaker: Jeff Agnoli, Office of Research Funding Opportunities, Finding the Right Lab	
	R Mar 21	T-tests, One-Way ANOVA, Non-parametric Statistics with SAS	
12	T Mar 26	Correlation and Regression with SAS	Statistics Homework 1 Due
	R Mar 28	Abstract Writing, Budget Preparation	
13	T Apr 2	Two-way Within/Between Subject ANOVA	
	R Apr 4	Multiple Regression with SAS	Statistics Homework 2 Due
14	T Apr 9	Grant Writing	
	R Apr 11	Factorial Designs	Budget Proposal Due
15	T Apr 16	Reporting Your Results	
	R Apr 18	Review	Statistics Homework 3 Due
16	T Apr 30	Final	Final Grant Proposal Due at 2 pm