BIOL 4304 Undergraduate Research in Biology

Biology Program, Department of Life Sciences

Instructor Information

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Ecology Research Lab: Science & Technology Building, room 361
Greenhouse space: East of Campus Police Building

Course description:

This course provides an independent review opportunity that will allow undergraduates majoring in biology to make an original intellectual contribution to the discipline. Research will be conducted in collaboration with a faculty mentor. Variable credit for a total of 3 maximum

This three-credit course allows our students to conduct field and/or laboratory ecology research during each academic semester. Students submit a project proposal, conduct their research, and turn in a final project report. The course includes university-mandatory training and is tailored to your research project and personal interest needs. **Students are expected to present their results at a research symposium or conference via a poster or an oral presentation**.

Course Objectives

1. Formulate testable research questions and hypotheses
2. Determine realistic goals and objectives
3. Conduct literature research on the best methods to be used for collecting and analyzing data
4. Engage in science-based discussion with peers and advisors
5. Design experiments based on available time and resources
6. Stay on task and assess project progress
7. Learn and follow best practices in both the field and laboratory
8. Use materials and equipment in a laboratory and field setting
9. Troubleshoot challenges using critical thinking and teamwork
10. Present research findings orally and publish them following a scientific publication format

Recommended resources

- All laboratory equipment and supplies used in the study will be provided by the faculty mentor

- Students should bring their own lab coats.
- The instructor will provide Personal Protective Equipment (PPE)
- Students will need to bring adequate clothing for outdoor activities
    - Slacks, jeans, no leggings
    - Closed shoes are appropriate for off-road walking or hiking (tennis shoes are OK)
    - Long-sleeved shirts are recommended as a second layer
    - Hat, cap, and bandana are also recommended
    - A water bottle is mandatory for all outdoor work
    - Sunblock and medicine needs are the students' responsibility
- Students will also need to use their personal vehicle for work conducted outside of campus

Course policies

Attendance: You are required to attend regular lab meetings and fulfill the minimum hour requirement per week for work conducted in the laboratory or in the field. During the development of the project proposal, literature review research, and data analysis, students may conduct work remotely.

Communication: All communication and inquiries to the instructor should be e-mail to jvaldezb@tamusa.edu. Cellphone communication should include texting as the first choice, before calling. A communication board and notebook will be available in the laboratory to notify other students or the instructor when a consumable is running low, or something needs to be replaced or purchased. Regular bi-weekly meetings are required, and weekly communication is expected. E-mail communication is important, and replies should not wait longer than 48 hours.

Netiquette: Avoid using inappropriate language with others verbally or in written form. All communications, both written and verbal, may be recorded during every online session.

Lab notebook: Student will be provided with a laboratory notebook. The notebook belongs to the laboratory; it may be borrowed and used for work outside the lab or at home, but it is expected to be returned. If shared, laboratory notebooks must always stay in the lab.

Mentee and Mentorship plan agreement: Student and Mentor will go over a work plan for the semester and will develop a compact (informal academic contract) of goals and objectives developed by the mentee and mentor. These will be assessed bi-weekly and modified as needed based on the Mentee and Mentor's mutual agreement

Project Proposal: The student will have two weeks to develop a project proposal with the guidance of the faculty mentor. Without the project proposal completed, a student cannot initiate their research project

Lab safety and policy: The student will read and become familiar with laboratory safety and procedures for the laboratory work or fieldwork required during their project.

Training: The student needs to complete all necessary training to initiate their project.

Peer Mentorship: Peer mentorship is a pedagogical strategy commonly used between working partners or collaborators. The goal is that one peer provides training and guidance to another student. However, peer mentors do not have supervisory roles over each other, nor is one expected to abide by the other's expectations if the faculty mentor has not determined such expectations.

Field and lab work: Students will set up lab and field projects and conduct laboratory analysis from field samples or laboratory experiments. Students are expected to dedicate 4 hours a week to their projects. You will spend more time with your faculty mentor in the field or in the lab, helping you set up your research. Your faculty mentor will gradually let you work on your own as you get a good grasp of your work. Work hours are flexible and can be determined every week. We will try to always do fieldwork in pairs, so lab and field work hours need to be well coordinated.

Research Presentation: You will have the chance to present at the A&M Student Research Symposium and other meetings

- Students can showcase their research with oral presentations, poster presentations, or roundtable discussions in a synchronous format for the one-day conference. If students have a research project they would like to present, a 150-word abstract must be submitted by TBA.
- Once accepted, the final poster or presentation must be submitted digitally by TBA**.**

Research proposal outline:

Introduction:

- Research question(s)
- Objective and Hypothesis
    - Research goal and objectives
    - Personal goal and objectives
- Background and justification

Methods

- Materials needed
- Methods and Procedures
- Experimental design
    - Generate table
- Data Analysis (includes statistical analysis)
- Timeline **(the timeline is specific for each project, following a chronogram format for three months)**
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Results

- Expected Results

Final Report outline:

Summary

Introduction:

- Background and justification
- Objective and Hypothesis

Methods

- Study site description
- Experimental procedures
- Materials and equipment needed for the experiment
- Data Analysis

Results

- Describe results and present main findings
- Include Tables or Figures with their corresponding descriptive legend on each figure
- Interpretation of results

Discussion

- Interpretation of results
- Compare results with previous research
- Explain the relevance of the main findings

Conclusion

- Take-home message
- Lessons learned

Grading

- Weekly participation (10pts)
- Mentorship plan (10pts)
- Research proposal (20pts)
- Research notebook/journal (20pts)
- Final project report (20pts)
- Research Presentation (poster, article format, PowerPoint presentation) (20 %)

A = 90 – 100 points

B = 80 – 89.9 points

C = 70 – 79.9 points

D = 60 – 69.9 points

F = <59.9 points