



BIOL 3104 Research Experience in Biology

Biology Program

Department of Natural Sciences

Instructor Information

Instructor: J. Rodolfo Valdez Barillas (Call me Dr. Valdez)

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Office: STEM Building, room 311L

Research Lab: STEM Building, room 361

Greenhouse area: East of the campus police building

Course description:

Research Experience in Biology is aimed at providing introductory research experience in a biology faculty laboratory. Through this experience, the student will gain an understanding of how research is conducted outside of a classroom and how the scientific method is actively applied in the specific discipline of the faculty research interests. Students will become part of the research team and will participate in laboratory or field activities as well as meetings/discussions. This course can be repeated for a maximum of 2 credits, the second of which must be under a different faculty member and thus a different discipline in Biology. This course can also be taken as zero-credit during the summer to maintain enrollment for compliance.

Research experience in biology under Dr. Valdez's mentorship allows our students to conduct field/or laboratory work on insect, microbial, and plant ecology research. Students submit a project proposal, conduct their research, and turn in a final project report.

Course Objectives

1. Formulate testable research questions and hypotheses
2. Understand basic field and laboratory safety training
3. Develop experimental and research goals as well as pedagogical and personal goals
4. Attend bi-weekly meetings and maintain periodic communication with mentor throughout the semester
5. Conduct literature research on the best methods to be used for collecting and analyzing data
6. Design experiments based on available time and resources
7. Use materials and equipment in a laboratory and field setting
8. Troubleshoot challenges using critical thinking and teamwork
9. Develop an initial project proposal and a final project report during the semester

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.
- Personal Protective Equipment (PPE) will be provided by the instructor
- 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
 - A hat, cap, or bandana is also recommended to cover your head
 - 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, student may conduct work remotely.

Communication: All communication and inquiries to the instructor should be e-mail to jvaldez@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, 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, are made 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. Training includes Lab Safety with Mary Jo Bilicek (mbilicek@tamusa.edu) and Citi Training modules. Dr. Valdez will provide specific training on equipment and lab policy.

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 proposal outline:

Introduction:

- Research question(s)
- Objective and Hypothesis
 - i. Research project goal and objectives
 - ii. Personal pedagogical goal and objectives
- Background and justification

Methods

- Materials needed
- Methods and Procedures
 - i. How variables will be measured and samples analyzed
- Experimental design
 - i. Use the chart indicated by the instructor
- Data Analysis
 - i. How data will be tabulated to be analyzed using different statistical approaches
- Timeline (**the timeline is specific for each project, following a chronogram format for three months**)

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

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| • weekly participation (20pts) | A = 90 – 100 points |
| • mentorship plan (20pts) | B = 80 – 89.9 points |
| • research proposal (20pts) | C = 70 – 79.9 points |
| • research notebook/journal (20pts) | D = 60 – 69.9 points |
| • final project report (20pts) | F = <59.9 points |