Biology 485: Research in Biology; 1 – 4 credits

Instructor: Dr. Susan Lewis
Office: Rankin 110
Phone: 524-7279
Office Hours: By appointment*
Email: lewiss@carrollu.edu

Course Description:
This course provides an opportunity for interested and highly motivated students to pursue research under the supervision of a Biology faculty member or an off-site research supervisor. Students will develop sufficient mastery of a research system of interest to allow them to acquire data appropriate for the resolution of their specific research question.

Prerequisites:
BIO 225 and permission of the course instructor

Student Learning Objectives:
After participating in undergraduate research, students should be able to:
- Define ethical practice in research and demonstrate ethical behaviors
- Demonstrate competency in some of the fundamentals of scientific inquiry including:
  - Formulating a testable hypothesis
  - Designing experiments that test this hypothesis and yield meaningful data
  - Demonstrating proficiency with respect to relevant research skills and techniques
  - Maintaining appropriate data collection records
  - Communicating results through a scientific poster
- Demonstrate the ability to work independently, including behaviors related to:
  - Managing time
  - Setting goals
  - Identifying a problem
  - Suggesting possible solutions
  - Applying the most appropriate solution
  - Evaluating the outcome
  - Asking for help when appropriate

Expectations:
A. Time Commitment: a typical 4-credit course meets for four hours per week over 14 weeks. In addition, a student is expected to spend approximately 2 hours working outside of class for every hour in class. Thus, in a 14-week research experience, a student should spend approximately 10 - 12 hours per week (140 - 160 hours, total). This includes both time spend in actual data collection and time spent working on activities related to the research experience.

Research experiences taken for fewer credits have pro-rated expectations:
1 credit 35 - 40 hours
<table>
<thead>
<tr>
<th>Credits</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>70 - 80</td>
</tr>
<tr>
<td>3</td>
<td>105 - 120</td>
</tr>
<tr>
<td>4</td>
<td>140 - 160</td>
</tr>
</tbody>
</table>

B. Activities: the actual activities the student is involved in will vary depending on the research setting. To the greatest extent possible, the student should gain hands-on experience with as many aspects of the research experience as possible.

C. Assignments:
Laboratory or Field Notebook -- the student should maintain a daily log of all activities completed as part of the research experience. Each entry should include the date and the beginning/ending time. The notebook should be a detailed and complete record of research activities, including methods, data collected, literature reviewed, problems encountered and responses developed, and statistical analyses. Details about the expectations for the notebook will be provided by the research mentor.

Ethics Discussion – the student will engage in a discussion of research ethics with their mentor, when possible in conjunction with other mentor/student teams. The students understanding of ethical principles in science will be assessed by way of this discussion.

Research poster – the student will report the results of his/her research experience by preparing an electronic poster that includes the following sections: Abstract, Introduction (with appropriate literature review), results, conclusions, acknowledgements, and references. The extensiveness of the literature review required will depend on the number of credits involved:
- 1 credit approximately 8 references cited
- 2 credits approximately 10 references cited
- 3 credits approximately 15 references cited
- 4 credits approximately 20 references cited

Evaluation:
The grade for the research experience will be determined based on the following criteria:
- 20 % Quality of the laboratory/field notebook
- 40 % Quality of the research poster
- 10 % Evidence that all requirements of the research experience have been met
- 30 % Evaluation by the research mentor

Syllabus modification
This syllabus may be modified by the instructor at any time. Students will always be notified at least one class meeting in advance, both in-class and via email, of any modifications to the syllabus.

Students with documented disabilities who may need accommodation or any student considering obtaining documentation should make an appointment with Carroll’s disabilities services coordinator, Marty Bledsoe, no later than the first week of class. Ms. Bledsoe can be reached at 524-7335 or bledsoe@carrollu.edu.