BIOLOGY 340: GENERAL ECOLOGY LABORATORY ECOLOGY FALL 2012

Instructor: Robert Laport Building 10, Rm. A290; rglsbi@rit.edu

Office hours: Monday 5-6pm and by appointment via email

Meeting times: Mon. 2:00 - 4:50, Thurs.: 9:00 – 11:50 (Building 10, Rm. A330)

Course web site: https://mycourses.rit.edu/

Description and goals: This course emphasizes the development of testable questions and implementation of appropriate observations and experiments on a series of topics in ecology. Many of the mini-studies will be done in the field on non-model organisms native to New York. Students will gain experience in field and lab methods used in ecology, sharing and managing data sets, taking field and lab notes, making tables and figures, using basic statistics, reading and critiquing published scientific studies, writing scientific reports, and presenting scientific results.

The process of scientific inquiry follows these steps:

1. *Observation* of an interesting pattern
2. Formulating a testable *question*
3. Proposing a *hypothesis* (an explanation for the observation)
4. Designing an experiment to *test* the hypothesis
5. Obtaining *data*
6. Analyzing and *reflecting* on your data
7. Finally, *communicating* the results

Comments: Many of these labs will be held outdoors—rain or shine—so come prepared with sturdy shoes, long pants, jacket, rain gear, warm jacket, water, snacks, insect spray, etc. Extremely inclement weather may lead to a change in the schedule, perhaps at short notice. If there is a change, I will email you by noon on lab day (or the night before morning labs). Check your email the night before lab days and on lab days. If you are unable to check email, have a fellow lab member contact you with any lab schedule changes. You are expected to be present at **all** formal lab periods and to turn in all lab reports.

In this course we will learn how to design and conduct (theory and practice) studies in ecology. Along the way, you will also learn how to critically evaluate scientific methods, present your work orally, and write scientific reports.

Expect to spend a substantial amount of time on experimental design, collecting data, writing papers, and completing assignments for this course. This lab focuses on designing experiments, collecting, analyzing, and presenting “real” data. Some aspects may be tedious, others challenging. However, the skills you learn in this lab will provide the foundation for ecology graduate programs and careers.

It is highly recommended that you do not procrastinate with assignments or you may become overwhelmed at the middle and the end of the course.

Be forewarned that some techniques in this lab may be challenging and, as in the real world, some experiments will go as planned and others will not. When procedures do not work as expected, we will think about possible causes and may design new experiments to test some possibilities.

You are expected to attend **all** formal lab sessions. You will need additional time to work on independent projects. At the end of the course you will have a sense of what is involved with conducting ecology field and laboratory work, performing experiments, and having a career in these fields.

OVERVIEW OF LAB ACTIVITIES:

Lab 1 Natural History of RIT campus: Emphasizing observation and asking questions to construct hypotheses about the natural world.

Lab 2 Forest Ecology of RIT campus: Learn techniques for quantifying the attributes of a forest ecosystem. We will spend time collecting data, analyzing it, and drawing conclusions about the past/future of the forest. Your data will be used for developing hypotheses about what forces may be affecting the forest habitat on campus.

Lab 3 Terrestrial Isopods: Over four weeks, we will design a study, collect, and analyze data for an ongoing ecological study of terrestrial isopods on the RIT campus. This will be centered around testing different baits in different habitats on campus to assess isopod diversity and abundance. You will write a paper to report the results of this study.

Lab 4 Rush Oak Openings: Western New York is uniquely situated at a transition between prairie and eastern deciduous forest. One of the features of such transitional habitat is Oak Savanna, a unique and important type of habitat dependent on repeated disturbance. Many plants and animals are endemic to these habitats, and we will tour one to experience how such a novel habitat fits into the ecosystem of western New York.

Lab 5 Independent Project: Based on the observation and activities in this lab course (or your personal experiences), develop a brief proposal for an experiment or observational study. The results of your study will be presented orally to the class during the last week of the quarter.

Schedule Outline:

Week (Dates)	Activity	Location
1 (Sep. 3/6)	Intro to Field Ecology	RIT Campus – Lab/Woods
2 (Sep. 10/13)	Forest Ecology of RIT Campus	RIT Campus – Lab/Woods
3 (Sep. 17/20)	Terrestrial Isopods – Site	RIT Campus – Lab/Woods
4 (Sep. 24/27)	Terrestrial Isopods – Collections	RIT Campus – Lab/Woods
5 (Oct. 1/4)	Terrestrial Isopods – Identification	RIT Campus – Lab
6 (Oct. 8/11)	Terrestrial Isopods – Data Analysis	RIT Campus – Lab
7 (Oct. 15/18)	Disturbance Ecology	Rush Oak Openings
8 (Oct. 22/25)	Independent Project	RIT Campus – Lab/Woods
9 (Oct. 29/Nov. 1)	Data Analysis	RIT Campus – Lab
10 (Nov. 5/8)	Oral Presentations	RIT Campus – Lab

Assignments:

Assignment	Due Date	Percent of Grade
Lab 1 Worksheet (Natural History)	Week 2	5%
Lab 2 Worksheet (Forest Ecology)	Week 4	6%
Lab 3 Paper (Terrestrial Isopods)	Finals Week	15%
Lab 4 Worksheet (Disturbance Ecology)	Week 8	3%
Lab 5 Independent Project Proposal	Week 7	6%
Lab 5 Independent Project Presentation	Week 10	15%

Late assignments are marked down 10% per week. If you are not going to be able to do a report (or take a quiz), you should consult with the instructor in advance.
Although many of the activities in this lab require and promote teamwork and interpersonal collaboration, assignments must be completed individually. For example, your lab report for the Terrestrial Isopods project may rely heavily on data collected as a group, but you must write the report in your own voice. Cheating and plagiarism are very serious offenses that will not be tolerated and will be reported to the University upon discovery. See D17.0, "Academic Conduct and Appeals Procedures," and D18.0, "RIT Student Conduct Process" of the Institute Policies and Procedures Manual.

GENERAL COMMENTS:

Paper: This course will have a writing assignment associated with the Isopod Study (see schedule). Structure your laboratory report as a normal scientific paper. We will read and discuss several scientific papers during the semester. They provide an excellent template of how to structure your reports.

Please note that your writing assignment will be evaluated rigorously—it is worth a significant portion of your grade. I expect careful, well-crafted responses. Assessments will be based on style (grammar, spelling conciseness, and clarity) and content. Writing is a skilled craft that is honed by practice. As such, I recommend you seek comments and feedback from your classmates and peers.

Final project: Students will develop a project relevant to topics in the lab. Assistance will be provided, but this is your opportunity to develop and test an idea that you conceive. If you have a question that you have always wanted to explore in depth, come talk to me about how it might be tested. A proposal must be made (and accepted) prior to data collection (see schedule), so start thinking about what interests you early in the quarter. Many studies will be weather dependent (animal behavior or annual plants), so bear in mind that it will be Autumn when most of the work will be conducted. Laboratory or computer-based projects are weather-independent and can be done later in the quarter.

Projects require the following; 1) development of a proposal, 2) presentation to the class of your hypothesis, experimental design and anticipated results, and 3) a 10-min talk in a scientific format.

Notebooks: The field/lab notebook is a "diary" of your activities and observations and is essential in both laboratory and fieldwork settings. A good notebook should be understandable by other workers as well as you. Field/lab books are used to record data as well as your first thoughts on ideas, chance unrelated observations, and your explanations for results. It is essential that the notebook be legible and well organized. You must bring your notebooks to class every day.

Field Notebooks will often include, or be composed entirely, of loose data sheets. These should be placed in a 3-ring binder. Original, handwritten data sheets should be kept even after this data is entered into a computer spreadsheet. In this course, all lab instructions, field notes, raw handwritten data sheets, computer spreadsheet printouts, and graded exercises should be organized and placed in a 3-ring binder. In the "real world," a field biologist is likely to have an additional bound waterproof notebook for field notes and some data collection.

While many of the details of what goes into a field notebook is individual style, there are certain features I strongly encourage you to include:

1. For each day you collect field data, record the GPS coordinates, location name, date, time, weather conditions, and names of data collectors.

2. Record any notable or interesting observations, even if you aren't sure if they directly relate to your current study. For example, if you are measuring trees and notice a lot of woodpecker activity, make note of this. Or, if a plot is near a wetland, or looks "odd" in some way, note this. These observations can help interpret your data, and they can provide ideas for future projects.

3. Record data clearly. Be sure the meaning of all abbreviations are clear. Do not mix tick marks and numbers ("II" can be "11" or "2").

4. At the end of every activity, provide a brief summary of questions being asked, what you did, why you did it, and any preliminary results.

Lab notebooks must be bound, much like a diary. A simple method to maintain a lab book is to write your observations sequentially. There are notebooks at the bookstore that have duplicate sheets. This style of notebook is not mandatory, however, and other styles of notebooks can be used.

While many of the details of what goes into a lab notebook is individual style, there are certain features we strongly encourage you to include:

1. At the beginning of each experimental section, there should be a short discussion describing the purpose of the experiment, describing any hypotheses that are being tested and at least one particular result that could disprove the hypothesis. Learn to state your hypotheses, verbally and on paper.

2. Outline the experiment, as a flow chart or cartoon (not necessarily repeating the lab handout!). Note what data is to be collected and what kind of layout you are going to use to record it. What kind of ad hoc analysis can you do in the lab to confirm that things are working? What are the controls?

   Steps 1 and 2 should be done BEFORE the lab period; we will occasionally check your lab books to see that this happens.

3. During the lab period, everything you write should be in the notebook (notes and tables of results, including ad hoc figures that you might use). Do <u>not</u> record on paper towels and then recopy to obtain a neat notebook. <u>Think before</u> you write. Your lab notebook should also contain additional notes about the experimental details so that you could use your notebook and the handout to reproduce the experiment with much less supervision and with greater security about its success

than in your first run-through. For example, a lab handout might indicate only that a gel should be run until the dye reaches about 2/3 of the way to the bottom. By recording the % gel, voltage/amperage, and running time, you can compare results from experiment to experiment.

4. After the lab, initial analysis: the rough figures and calculations that you might do when you start your analysis of the results.

5. Any time, ideas for repeating the experiment to get better results …or, if the experiment was unsuccessful, repeating the experiment to make it work.