

Ecology Lab (Biology 204)
Spring 2017
(T 2:30 pm – 5:20 pm ISC 107)

The ecology laboratory is designed to complement the second-year ecology course, Principles of Ecology (Biology 203). Laboratories will consist of research projects that address questions at each level of ecological organization, from organisms to populations, communities, and ecosystems. Emphasis is placed on the types of research questions and designs used by a variety of sub-disciplines of ecology to expose students to the diverse nature of this field. Students will be engaged in all aspects of the development of an ecological study: making observations, formulating hypotheses and predictions, designing experiments and strategies for data collection, statistical and graphical analysis, interpreting results, and reporting findings in written and oral formats.

Instructor: Dr. Jennifer L. Apple Office: ISC 258 Phone: 245-5442
e-mail: applej@geneseo.edu Lab: ISC 340
Office hours: MW 10 am – 11:30 am, R 11:30 am – 12:30 pm
(I am also available to meet with students by appointment outside of office hours.)

Course website: canvas.geneseo.edu

Required text: *A Field Guide to Eastern Forests* by John Kricher (Houghton Mifflin, 1998)

Learning Outcomes

Successful students will be able to:

- make observations, generate hypotheses, and carry out simple experiments and/or collect field data to answer questions from different sub-disciplines in ecology
- collect, organize, analyze, and present ecological data using appropriate sampling methods and instrumentation and quantitative statistical and graphical analyses
- explore and evaluate the primary ecological literature to provide background information for their studies as well as to help put their results into the context of other ecological research
- communicate their findings using the conventions of scientific writing in reports which include: 1) an introduction which identifies the context for the work, citing previous research; 2) a description of methods; 3) results including figures, tables, and statistics; and 4) a discussion which identifies and explains the key results and their significance

Course Organization

Working in groups of four, students will cooperate to set up and run experiments or make observations, collect data, and prepare a formal lab report for each of the four projects done over the course of the semester. Because some projects require more time and steps than others, we may be engaged in several projects at one time.

Overview of Projects

Project 1 Mimicry and predation risk (Behavior/evolutionary ecology) – In this experiment, we will observe and quantify the responses of local birds to the availability of artificial prey that vary in appearance and palatability. Through this study we will investigate factors that influence the effectiveness of Batesian mimicry as an anti-predator strategy and document patterns in bird foraging behavior.

Project 2 Goldenrods and insect galls (Population ecology) – In this project we will sample stems of goldenrod plants in the field to measure the incidence of galls caused by various gall-forming insects. In the lab, we will dissect galls and identify their inhabitants. Data collected may include the spatial distribution of galls within and between patches of plants, attributes of plants with and without galls, and predation and/or parasitism rates on galling insects.

Project 3 Forest communities (Community ecology) – We will learn how to quantitatively describe a forest community using plot and plotless sampling techniques. We will calculate diversity indices and standard measures of plant community structure to compare forest composition and structure in at least two contrasting environments in a local forest stand.

Project 4 Soil CO₂ emission (Ecosystem ecology) – In a forested ecosystem, we will investigate factors that affect soil CO₂ emission, a process that results from both root respiration and decomposition of organic matter in soils. Using the soda-lime method we will determine the effects of particular microclimate or soil characteristics on the rate of CO₂ emission in a field incubation experiment.

Expectations

Your group will write a formal lab report for each of the projects described above. These reports should include the following components:

1. Introduction
2. Methods
3. Results
4. Discussion

Your report should also include a descriptive title, list of authors, and a literature cited section.

For each group lab report, one person will serve in each of the capacities listed below. These tasks should be rotated among students so that each plays each role once.

1. **Coordinator** – Assembles the contributions of all group members, writes the **discussion** section, and is responsible for the final editing and formatting of the report.
2. **Researcher** – Reviews the literature for background information and relevant results from other studies (and provides properly formatted citations to coordinator), helps to establish the context in which the research is done, and writes the **introduction**.
3. **Collector** – Organizes the data and provides them to the analyst in a compact form, takes careful notes of procedures followed by the group, and writes the **methods** section.
4. **Analyst** – Prepares final graphs and tables to present the data, performs statistical analyses, and writes the **results** section. All group members should cooperate in deciding how to analyze the data and which data to present and are encouraged to discuss their analyses with the instructor early in the process of preparing the report.

All members of the group will participate in the design of each project as well as the collection of data. While everyone in the group will contribute to the report in the ways outlined above, the state of the final product is ultimately the coordinator's responsibility. It is in everyone's best interest for the coordinator to assemble a complete draft of the report in time for all group members to read, edit, and comment on it before turning in the final version. All files (Excel spreadsheets, R code, .csv files referred to in R code, etc.) used for analyzing data must be submitted along with drafts or final reports (or points may be deducted from your report and evaluation will be delayed). After the submission of each lab report and again at the end of the course, everyone will complete a form evaluating the participation of their peers which will contribute to determining the participation grade earned by each student.

Course Evaluation

Group lab reports **55%** (all members receive same grade on each report)

Individually graded assignments & quizzes **30%** (data analysis/writing & primary literature assignments; online and in-class quizzes)

Presentation **5%** (organization & effectiveness of the group presentation)

Participation (includes peer evaluation, in-class assignments, engagement in lab work, performance in the presentation) **10%**

Course Policies

Lab attendance. Your participation in lab every week is expected. Unexcused absences will negatively affect your participation grade and increase the workload of your fellow group members. There may be options to make up lab work if you notify the instructor in advance and/or provide written documentation for a legitimate reason for absence (college activity, family emergency, illness). Opportunities for making up labs are provided at the discretion of the instructor.

Lab preparation. You are expected to pay attention to the syllabus, emails from me, and posted announcements on Canvas and come prepared for each day's planned activities. If we are doing a field-based activity, you should be dressed for the weather with appropriate outerwear and shoes that can get muddy or wet – it is your responsibility to check the weather conditions and use your judgment about what to wear. Bring all lab-related handouts to each lab session (especially previously collected data), and when requested, bring your laptops. Sometimes plans for a lab session may change at the last minute because of the weather; you should make sure to check your email on the day of a lab to find out any changes. Please be courteous to the instructor and your classmates by arriving on time, particularly on field trip days.

Office hours and email. I realize that my office hours are not going to be convenient to everyone. I am happy to meet with you at other times, but I would appreciate you emailing me first to set up an appointment. When doing so, please suggest some possible times that you are available to meet in your email to make our correspondence more efficient. I can often answer questions by email as well. Please do not expect an immediate response – I will try to get back to you within 24 hours. If you are emailing me about a problem with R, be very specific about your problem. I often cannot diagnose a problem unless you send me your complete R code – you can easily attach or copy this into your email (include the data file too if you are using one!).

Group dynamics. Success in this course depends to a great degree on effective collaboration with your group members. If your group is having any problems working together, please alert me as soon as possible in the semester so that we can come up with a solution.

Plagiarism and academic dishonesty. Plagiarism and other forms of academic dishonesty (e.g., copying work from another student) will not be tolerated. According to the Student Code of Conduct (http://www.geneseo.edu/dean_office/dishonesty), “plagiarism shall be considered to be deliberate representation of someone else’s words or ideas as one’s own or the deliberate arrangement of someone else’s material(s) as one’s own.” Read this code to understand the consequences of all forms of academic dishonesty. Take care to properly cite sources of ideas, figures, data, etc. (including internet sources) in your writing and presentations. Even if you properly cite your source, when you borrow wording and sentence structure from the original source and pass it off as your own (i.e., by not using quotation marks), you are guilty of plagiarism. Learn how to paraphrase in your own words information from the original source.

Accommodations

SUNY Geneseo will make reasonable accommodations for persons with documented physical, emotional, or cognitive disabilities. Accommodations will also be made for medical conditions related to pregnancy or parenting. Students should contact Dean Buggie-Hunt in the Office of Disability Services (tbuggieh@geneseo.edu or 585-245-5112) and their instructor to discuss needed accommodations as early as possible in the semester.

Mental health considerations

Diminished mental health, including significant stress, mood changes, excessive worry, or problems with eating and/or sleeping can interfere with optimal academic performance. The source of symptoms might be strictly related to your course work; if so, please speak with me. However, problems with relationships, family worries, loss, or a personal struggle or crisis can also contribute to decreased academic performance.

SUNY Geneseo provides mental health services to support the academic success of students. Counseling Services, a part of the Lauderdale Center for Student Health & Counseling, offers free, confidential psychological services to help you manage personal challenges that may threaten your well-being.

In the event I suspect you need additional support, I will express my concerns and the reasons for them, and remind you of resources (e.g., Counseling Services, Career Services, Dean of Students, etc.) that might be helpful to you. It is not my intention to know the details of what might be bothering you, but simply to let you know I am concerned and that help, if needed, is available. Getting help is a smart and courageous thing to do – for yourself and for those who care about you.

Course schedule

Since we have to depend on the weather and the schedules of living things to determine when and how to run our projects, the course schedule on the next page is subject to change, often. Welcome to the world of ecologists!

Tentative Course Schedule

Date	Notes [†]	Activity	Assignments [‡]
Jan 17	FW	Introduction to course; introduce mimicry project & visit Arboretum; activity on generating ecological questions and hypotheses (field trip)	
Jan 24	comp	Plan mimicry project; start statistics tutorial and data analysis exercise 1 – data analysis & presentation	Do online quiz on lab report format;; install R and RStudio on your laptop and do pre-lab R exercise
Jan 31	comp	<u>Mimicry</u> : prepare baits and start feeding trials (run field experiment through Feb 7)	Data analysis exercise 1 due Thursday, Feb 2
Feb 7	comp	<u>Mimicry</u> : practice data analysis; plan report in groups; complete statistics tutorial	Read pp. 332-341, 356-358, 442-450 & take online quiz on reading
Feb 14	comp	<u>Goldenrod galls</u> : introduction; discussion of primary literature, group presentations of research papers	Answer questions on research paper for Feb 14 ; Data analysis exercise 2 due Fri, Feb 17
Feb 21	FW	<u>Goldenrod galls</u> : field trip to take plant measurements and collect insect galls	Stats quiz in lab; Mimicry lab draft due Thurs, Feb 23
Feb 28	comp	<u>Goldenrod galls</u> : more gall dissection, organize data, plan report; discuss primary literature papers in groups	Primary literature summary due ; Final mimicry lab due Friday, Mar 3
Mar 7	FW	<u>Forest communities</u> : field trip to learn tree identification and forest sampling techniques and develop group project ideas	Read pp. 8-51, 58-70, 72-75, 77-85; take online quiz on reading
SPRING BREAK: Mar 13-17			
Mar 21	FW	<u>Forest communities</u> : field trip to carry out group projects	Tree ID quiz (in class, timed)
Mar 28	comp	<u>Forest communities</u> : data analysis, plan report; work on consensus analysis of primary literature reading with group	Primary literature analysis due by lab time ; Goldenrod lab due Friday, Mar 31
Apr 4	FW	<u>Soil CO₂ emission</u> : field trip to locate sites for CO ₂ emission study, understory sampling; weigh soil CO ₂ sampling jars	Read pp. 415-436; take online quiz on reading
Apr 11	FW	<u>Soil CO₂ emission</u> : field trip to set up experiment and collect soil samples (retrieve jars 48-72 hrs later on your own, measure soil wet	
Apr 18	comp	<u>Soil CO₂ emission</u> : Soil CO ₂ lab measurements	Forest communities lab due Thursday, Apr 20
Apr 25		No formal lab – GREAT Day	
May 2	comp	Wrap-up soil CO ₂ emission lab; group oral presentations on primary literature reading	Soil CO₂ emission lab due Monday, May 8

[†] **FW** = field work: wear appropriate clothing & footwear for working outside – check weather; **comp**: bring your laptop computer to lab

[‡] Readings refer to *A Field Guide to Eastern Forests* by John Kricher; quizzes should be completed before lab period; writing assignments due by 11:59 pm of due date in Canvas unless otherwise indicated