

Ecology Lab (Biology 204)

Spring 2020

(T 2:30 pm – 5:20 pm ISC 107)

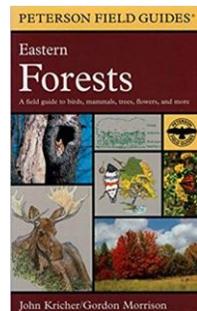
Course overview

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. You 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.

Course details

Dr. Jennifer L. Apple (*she/her/hers*) Office: ISC 258 Lab: ISC 340

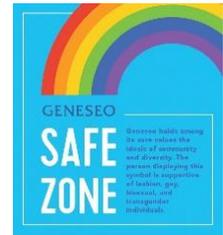
e-mail: applej@geneseo.edu Phone: 245-5442
Office hours: M 10 – 11:30 am, W 1:30 – 2:30 pm,
R 11:30 am – 1 pm (I am also available to meet with you by
appointment.)



Required text: *A Field Guide to Eastern Forests* by John Kricher (Houghton Mifflin, 1998; ISBN: 978-0395928950)

Course website: canvas.geneseo.edu

Other requirements: Laptop with Microsoft Word, Excel, R, and RStudio installed



Learning outcomes

Upon completion of this course, 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 and presentations 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

How is this course organized?

Working in groups of four (ideally), you will cooperate to set up and run experiments or make observations, collect data, and prepare for each of 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. You will prepare written or oral presentations of their results either as a group or as individuals, depending on the project.

What projects will we be doing?

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.

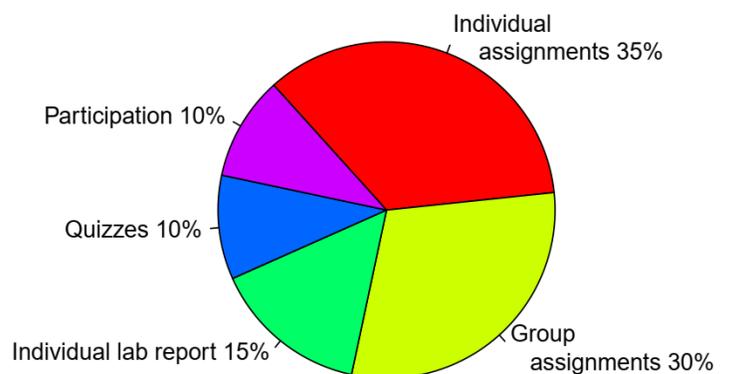
Project 2 Goldenrods and insect galls (Population ecology) – In this project we will sample stems of goldenrod plants in the field to measure the incidence of galls caused by various gall-forming insects. In the lab, we will dissect galls and identify their inhabitants. Data collected may include the 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.

How will your grade be determined?

Your grade is based on a combination of group and individual assignments. **Group assignments** include data analysis, presentations, and written lab reports (parts or complete). **Individual assignments** include your data analysis exercises and some writing and primary literature-related assignments. You will periodically have **quizzes** (usually online). A single **individual written lab report** will make up 15% of your grade. And your **participation** grade is based on completion of in-class assignments, your engagement in lab work, your individual performance in group presentations, and peer evaluations.



Grading scale

A 93.0-100%	B 83.0-86.9%	C 73.0-76.9%
A- 90.0-92.9%	B- 80.0-82.9%	C- 70.0-72.9%
B+ 87.0-89.9%	C+ 77.0-79.9%	D 60.0-69.9%

I follow conventional rounding procedures, so a 92.94% would represent an A- (rounded down to 92.9%), while a 92.95% would be rounded up to 93.0% and an A.

Developing your scientific writing and data analysis skills

Throughout this course we will be developing your skills in writing lab reports and employing the conventions of scientific writing. You will be preparing either partial or full reports using the professional standards of scientific writing for each of the projects described above. Some of these reports will be prepared in stages, with some components prepared as an individual and some as a group. For several projects, you will communicate results using oral presentations. The components of each report include the following sections, along with a descriptive project title and literature cited.

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

All members of the group will participate in the design of each project as well as the collection and analysis of data. It is in everyone's best interest that your group establishes a good working relationship, which will sometimes involve meeting outside of lab time.

Your first two individually graded data analysis assignments will give you practice analyzing data, preparing figures, and describing the results in a results section. For the mimicry lab, everyone will write their own introduction section. You will practice all these skills to prepare an individually graded complete report of the second project on goldenrod galls. For the forest communities project and soil CO₂ emission project, you will work as groups to analyze and interpret your data and will present your results together in a Powerpoint presentation. Your group will also prepare a final written results and discussion for the soil CO₂ emission project.

All files (Excel spreadsheets, R code, .csv files referred to in R code, etc.) used for analyzing your data must be submitted by the dates indicated so that I can check your analyses and provide feedback. Submissions of final reports and presentations must also be accompanied by your R code and data as they are part of my evaluation of your work.

How to be successful in this course

Come to lab. 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, and you will not have an opportunity to make up missed work. There may be options to make up lab work if you notify the instructor in advance and provide written documentation for a legitimate reason for absence (college activity, family emergency, illness). If you do not contact the instructor about ways you can make up an excused absence from lab, your participation grade will be negatively affected.

Be prepared for lab. 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.

Be safe! Please be prepared for our field trips by dressing appropriately for the weather and terrain, bringing water, and carrying any medication you might need (allergy medication, inhaler for asthma, epipen, etc.). Inform me of any allergies or other medical conditions that could require emergency treatment. Also be prepared by applying sunscreen when appropriate or wearing clothing to protect yourself from the sun. We could encounter mosquitoes, ticks, other biting/stinging insects, and poison ivy on our outings, so be aware of these risks, and feel free to ask me any questions about them.

Work as a team. Success in this course depends to a great degree on effective collaboration with your group members. Be responsive to your group members for setting up meetings and arranging completion of your assignments. If your group is having problems working together, please alert me as soon as possible in the semester so that we can come up with a solution. Procrastination is often at the root of difficulties in completing assignments well, so each of you should make an effort to get started early to avoid holding up your group.

Back up your work. Do yourself a favor to avoid last-minute computer calamities and stress by saving your work frequently and backing up your files using some kind of cloud storage system like Google Drive, Dropbox, or some other service. Also, don't wait until the day before a deadline to get started!

Communicating with me

Office hours. 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.

Email communication. I can often answer questions by email as well, even about your data analysis. 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 issue. I usually 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!). Feel free to seek help in this way - sometimes it only requires a second set of eyes to solve your problem!

Course policies

Late assignments. Late assignments will not be accepted after graded work has been returned to students. Late assignments will be penalized by a loss of 5% of the total assignment's points possible per day. (But if you think you must turn in something late because of extenuating circumstances, feel free to discuss the situation with me and we can negotiate terms.)

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.

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Student success resources

Accessibility and accommodations. SUNY Geneseo will make reasonable accommodations for persons with documented physical, emotional, or cognitive disabilities. Accommodations will be made for medical conditions related to pregnancy or parenting. Requests for accommodations including letters or review of existing accommodations should be directed to the Office of Accessibility in Erwin 22 (disabilityservices@geneseo.edu or 585-245-5112). Students with letters of accommodations should submit a letter to each faculty member at the beginning of the semester and discuss specific arrangements. Additional information on the Office of Accessibility is available at www.geneseo.edu/dean_office/disability_services.

Student well-being. Prioritizing well-being can support the achievement of academic goals and alleviate stress. Eating nutritious foods, getting enough sleep, exercising, avoiding drugs and alcohol, maintaining healthy relationships, and building in time to relax all help promote a healthy lifestyle and general well-being.

Concerns about academic performance, health situations, family health and wellness (including the loss of a loved one), interpersonal relationships and commitments, and other factors can contribute to stress. Students are strongly encouraged to communicate their needs to faculty and staff and seek support if they are experiencing unmanageable stress or are having difficulties with daily functioning. The Dean of Students (585-245-5706) can assist and provide direction to appropriate campus resources. For more information, see www.geneseo.edu/dean_students.

Mental health. As a student, you may experience a range of challenges that can impact your mental health and thus impact your learning; common examples include increased anxiety, shifts in mood, strained relationships, difficulties related to substance use, trouble concentrating, and lack of motivation, among many others. These experiences may reduce your ability to participate fully in daily activities and affect your academic performance.

SUNY Geneseo offers free, confidential counseling for students at the Lauderdale Center for Student Health and Counseling, and seeking support for your mental health can be key to your success at college. You can learn more about the various mental health services available on campus at health.geneseo.edu. Getting help is a smart and courageous thing to do -- for yourself and for those who care about you.

Other resources. Additional resources are available to support your academic success and well-being, including academic support services, library research help, computer and technology support, and food security. See the “Student Success Resources” link on the Canvas course page for more information about these services.

Course schedule

Since we must 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!

Ecology Lab – Spring 2020: Course Schedule

Date	Notes [†]	Activity	Assignments [‡]
Jan 28	FW	Introduction to course; introduce mimicry project & plan project; visit Arboretum (field trip)	<i>Note: ¹ indicates individual assignment, ^G indicates group assignment; all quizzes are individual</i>
Feb 4	comp	<u>Mimicry</u> : prepare baits and start feeding trials (run field experiment through Feb 11)	Do online quiz on lab report format; install R and RStudio on your laptop and do pre-lab R exercise
Feb 11	comp	Start statistics tutorial & data analysis exercise 1	Read pp. 332-341, 356-358, 442-450 & take online quiz on reading
Feb 18	comp	<u>Mimicry</u> : practice data analysis; create graphs & discuss results; complete statistics tutorial	Data analysis exercise 1¹ due Thursday, Feb 20
Feb 25	comp	<u>Goldenrod galls</u> : discussion of primary literature, group presentations of goldenrod research papers	Answers to questions on research paper¹ due
Mar 3	FW	<u>Goldenrod galls</u> : field trip to take plant measurements and collect insect galls	Data analysis exercise 2¹ due; Mimicry lab introduction¹ due Saturday, Mar 7
Mar 10	comp	<u>Goldenrod galls</u> : gall dissection, data entry	Online quiz on the " Solidago Eurosta gall " website; Stats quiz in lab; Hypotheses/data analysis plan¹ for goldenrod lab due Friday, Mar 13
SPRING BREAK: Mar 16-20			
Mar 24	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; optional goldenrod lab draft due Friday, Mar 27 (at least results section)
Mar 31	FW	<u>Forest communities</u> : field trip to carry out group projects	Tree ID quiz (in class, timed)
Apr 7	comp	<u>Forest communities</u> : data analysis, plan report	Goldenrod lab report¹ due Saturday, April 11
Apr 14	FW	<u>Soil CO₂ emission</u> : field trip to locate sites for soil CO ₂ emission study, understory sampling; weigh soil CO ₂ sampling jars	Read pp. 415-436; take online quiz on reading; Forest communities data analysis and results section^G due Wednesday, April 15
Apr 21	FW	<u>Soil CO₂ emission</u> : field trip to set up experiment and collect soil samples; Forest communities project group presentations	(Retrieve jars 48-72 hrs after setup on your own); Forest communities lab Powerpoint^G due
Apr 28	comp	<u>Soil CO₂ emission</u> : final measurements, data analysis; plan oral presentations	
May 5	comp	Group oral presentations on soil CO ₂ emission lab project	Soil CO₂ emission lab data analysis & results section^G and Powerpoint^G due; final written results/discussion^G due Saturday, May 9

[†] **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