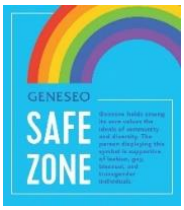
Ecology Lab (Biology 204)
Fall 2023
M 2:00 pm – 4:50 pm ISC 107

Course overview

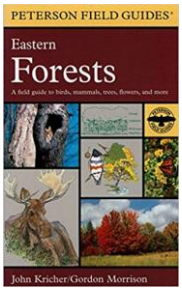
The ecology laboratory is designed to complement the second-year ecology course, Principles of Ecology (Biology 203). Laboratories will consist of research projects that address questions at different levels of ecological organization, from organisms to populations, communities, and ecosystems. We explore research questions and methods 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: to be determined (check Brightspace)



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

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

Course website: access via Brightspace learning management system

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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 data to answer questions from different sub-disciplines in ecology
- collect ecological data using appropriate sampling methods and instrumentation
- organize, analyze and present ecological data using appropriate 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 oral presentations
- productively collaborate with a team to plan and carry out projects and communicate scientific information and results effectively

How is this course organized?

Working in groups of three or four, you will cooperate to set up and run experiments or make observations, collect data, and prepare for each of three 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 also be practicing skills in data analysis and visualization using R throughout the course. You will work in groups to prepare written and oral presentations of your results.

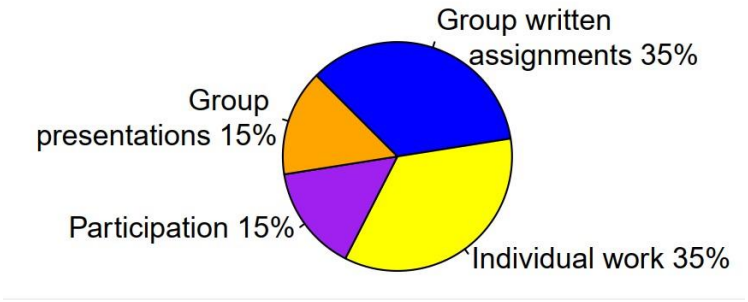
What projects will we be doing?

Project 1 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 local forest stands.

Project 2 Soil CO_2 emission (Ecosystem ecology) – In a forested ecosystem, we will investigate factors that affect soil CO_2 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 soil CO_2 emission in a field incubation experiment.

Project 3 Leaf-cutter ant foraging behavior (Behavioral ecology and organismal ecology) – You will collect quantitative data from images and or videos of leaf-cutter ants foraging in a Panamanian rainforest. You will use these data to test hypotheses that you have developed about this species' foraging patterns.

How will your grade be determined?



Group written assignments (35%): These written assignments include plans for lab reports, data analysis for projects, and final lab reports.

Group presentations (15%): Your group will present the results of your three main projects.

Individual assignments/quizzes (35%): You will have online or in-classes quizzes on most weeks to help prepare you for lab activities or assess you on skills. You will also have some individual assignments related to data analysis.

Participation (15%): Your participation grade is based on completion of in-class assignments, your engagement in lab work, your individual performance in group presentations, peer evaluations, and reflections on your participation.

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 reports using the professional standards of scientific writing for each of the projects described above. The components of each report include the following sections, along with a descriptive project title and literature cited section.

1. Introduction, which identifies the context for the work, citing previous research
2. Methods
3. Results, including figures, tables, and statistical support
4. Discussion, which identifies and explains the key results and their significance

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.

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 the evaluation of your work.

How to be successful in this course

Be prepared for lab

You are expected to pay attention to the syllabus, emails from me, and posted announcements on Brightspace 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.

If you must miss lab because of illness, it is your responsibility to contact me in a timely manner to make arrangements for making up any work you missed for the lab. If you miss lab without providing an explanation, you cannot make up the work and your participation grade will be negatively affected.

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.

If you must miss lab, you should also contact your group members about your absence to learn what you will be responsible for on any group assignments. You are still responsible for contributing to group assignments even if you miss lab. I will not coordinate your interactions with your group members. It is your responsibility to contact me in a timely manner to make arrangements for making up any work you missed for the lab.

Come see me if you need help!

Office hours. I am available for in-person office hours. If any of the posted times do not suit you, you can email me to set up another appointment for an in-person meeting or video conference via Teams. 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 your questions by email as well. I will try to get back to you within 24 hours. If you have a question about R, attach both your complete R code (not just the part with an error) and the data file (.csv) that you are using with it (if applicable) to your email message. A screenshot of an error message is generally useless in diagnosing your problem without the actual code itself. Feel free to seek help in this way - sometimes it only requires a second set of eyes to solve your problem!

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!

Attendance guidelines, public health, and your well-being and mental health

Guidelines for attendance and public health considerations

SUNY Geneseo is a residential liberal arts college where we all learn together in a shared space. Our laboratory community is vital for engaging in discussions, solving problems, and answering questions together. I strive to create an interactive and collaborative laboratory space, and in return I expect you to attend and engage in the activities.

We know that COVID is shifting from a pandemic to endemic stage, and it's possible that some of you may get infected over the course of the semester. Because we want you to be successful and because we value your contribution to the course, we expect you to prioritize consistent attendance. If you are experiencing symptoms associated with COVID on a day we have class, please take a self-test. If you test negative and feel well enough to attend, put on a well-fitting mask, come to class, and maintain physical distance as much as possible. If your symptoms do not allow you to attend class, stay home (except to go to the health center),

rest, and take care of yourself. I can support you to keep up with class if you are out for COVID or other health-related reasons, but I need you to be proactive in letting me know when you will be absent and why. Although I can work with you on keeping up, you may miss some course content and extended absences may impact your ability to realize your full potential in this class. For extended absences (i.e., more than a couple of days of classes), you should contact the Dean of Students (585-245-5706, http://www.geneseo.edu/dean_students) who can assist with reaching out to all of your professors about challenges you face and accommodations you may require. I want you to succeed and learn in this class, and I want to protect our community from COVID as best as I can.

Student well-being and mental health

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.

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. 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 can assist and provide direction to appropriate campus resources.

SUNY Geneseo offers free, confidential counseling for students at the Lauderdale Center for Student Health and Counseling; 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 . To request a counseling appointment, please complete the online form through myhealth.geneseo.edu. Getting help is a smart and courageous thing to do -- for yourself and for those who care about you.

See the "Course orientation" module on Brightspace for more resources available to students facing food insecurity or short-term financial crisis.

Lab and field work and safety

Your safety and comfort are important to me. 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. Also, be mindful of your safety if you go to a field site on your own outside of our regular lab sessions. It is a good idea to bring a friend with you, or at least to tell someone where you are going and when you expect to be back.

No food or drink containers are permitted in the lab, either during or outside regular lab times.

Other course policies

Late work

Online quizzes should be completed by the indicated due date to help you prepare for lab activities. Once closed on Brightspace the quizzes will not be opened up again unless there are extenuating circumstances. Graded 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 (cheating, turning in another student's work as your own) will not be tolerated. Evidence of academic dishonesty is grounds for a score of zero on any assignment and further action including notifying the department chair, Dean of Academic Planning and Advising, Dean of Students, and Student Conduct Board, which can result a report filed with the Dean of Students.

According to the Academic Dishonesty Policy in the Student Handbook (https://www.geneseo.edu/handbook/academic-dishonesty-policy), plagiarism includes the following:

1. direct quotation without identifying punctuation and citation of source;
2. paraphrase of expression or thought without proper attribution;
3. unacknowledged dependence upon a source in plan, organization, or argument.

In SUNY Geneseo's policy, "Plagiarism is the representation of someone else's words or ideas as one's own or the arrangement of someone else's material(s) as one's own." 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.

Working with students on homework. Although I do not mind if you work with other students on homework assignments, you must each produce original written answers to the questions and prepare or adapt code on your own (no copying and pasting from classmates). Identical or highly similar responses from two or more students suggest answers are being copied and all students may receive a zero or substantial penalty on the assignment. Feel free to collaborate and help each other, but always turn in your own work.

Use of AI tools. All work on written assignments should be in your own words and represent your own thoughts and opinions (or those of your group members in the case of group assignments). You may not use a large language model, such as OpenAI's chatGPT, to edit or generate text because it is not guaranteed to be free from using the intellectual products of others.

Copyright statement

Many of the materials that are provided to students in this course have been created by me or other faculty (lecture slides, assignments, instructional documents, etc.). Students would be best to assume that all course materials are protected by legal copyright. Copyright will be indicated by a "© DATE AUTHOR" on the document. Copyright protection means that reproduction of this material is prohibited without the author's consent. Thus, students are prohibited sharing or posting copyrighted material to any websites outside our

course Brightspace site. Students are also prohibited from reproducing material to be shared with other more limited groups (*e,g.,* sorority/fraternity test bank).

Religious observation and class attendance

New York State Education Law 224-a stipulates that "any student in an institution of higher education who is unable, because of [their] religious beliefs, to attend classes on a particular day or days shall, because of such absence on the particular day or days, be excused from any examination or any study or work requirements" (see https://www.geneseo.edu/apca/classroom-policies). SUNY Geneseo has a commitment to inclusion and belonging, and I want to stress my respect for the diverse identities and faith traditions of students in my class. If you anticipate an absence due to religious observations, please contact me as soon as possible in advance to discuss your needs and arrange make up plans.

Military obligations and class attendance

Federal and New York State law requires institutions of higher education to provide an excused leave of absence from classes without penalty to students enrolled in the National Guard or armed forces reserves who are called to active duty. If you are called to active military duty and need to miss classes, please let me know and consult as soon as possible with the Dean of Students.

Diversity and inclusion

The Department of Biology has pledged to develop more inclusive pedagogical practices and work to promote diversity in our curriculum while confronting racism, particularly ways in which science has been used to sustain it (Biology Department's Statement in Support of Racial Justice, also available on Department of Biology website). I hope to create an inclusive and supporting learning environment in which anyone can succeed, regardless of your identity (race, gender, ethnicity, sexual orientation, age, socioeconomic status, religion, and ability). I want to provide for students' growth as scientists and learners and promote a sense of belonging.

Land acknowledgment

Land acknowledgements are expressions of sorrow and remembrance to those whose historic territory one resides on. Geneseo resides on the historic homelands of the Seneca Nation of Indians and Tonawanda Seneca Nation. As stated in the Community Commitment to Diversity, Equity, and Inclusion, "we at SUNY Geneseo have an obligation to recognize all who, through history or identity, have been marginalized or oppressed, made invisible or silenced." I encourage you to learn more about these original occupants and those indigenous to other places you have lived. You may consider using the Native Land app and/or websites such as sni.org to learn more about the community of more than 7,000 enrolled Indigenous Peoples**.**

Student success resources at SUNY Geneseo

Accessibility and accommodations

SUNY Geneseo is dedicated to providing an equitable and inclusive educational experience for all students. The Office of Accessibility will coordinate reasonable accommodations for persons with documented physical,

emotional, or cognitive disabilities to ensure equal access to academic programs, activities, and services at Geneseo. Students with approved accommodations may submit a semester request to renew their academic accommodations. Please visit the OAS website for information on the process for requesting academic accommodations. Please contact the Office of Accessibility Services for questions related to access and accommodations: access@geneseo.edu, 585-245-5112, www.geneseo.edu/accessibility-office.

Reporting bias-related incidents

Here at SUNY Geneseo, we want to provide a space where everyone feels welcome to learn and grow in their identities as well as in their role as students, faculty, and staff. If in the unfortunate instance you experience an incident of bias, we encourage you to reach out to the we encourage you to reach out to the Chief Diversity Officer (routenberg@geneseo.edu), Director of Multicultural Affairs (charcum@geneseo.edu), and/or our University Police Department. In trying to create an environment that facilitates growth through diverse thoughts and ideas, reporting incidents of bias - including threats, vandalism, and microaggressive behaviors - can help bring a better understanding of our campus climate as well as provide opportunities for learning and restoring harm.

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, food security support, and emergency funding. See the "Student success resources" and "Well-being and mental health" pages in the Brightspace course orientation module 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 – Fall 2023: Course Schedule

Date	Notes[†]	Activity	Individual assignments[‡]	Group assignments
Week 1: 28 Aug	FW	Introduction to course, activity on generating ecological questions & hypotheses in Arboretum (field trip)	Quiz #1 – poison ivy ID	
4 Sept		LABOR DAY – no lab	Pre-lab R assignment due Wed, 6 Sept	
Week 2: 11 Sept	FW	Forest communities: **field trip** to Indian Fort; learn trees, methods, collect data as a class	Quiz #2 – reading quiz (online; on Kricher pp. 8-51, 58-62, 72-75, 77-85)	
Week 3: 18 Sept	FW	Forest communities: **field trip** to Research Reserve; work in groups to collect data	Quiz #3 – tree ID (in lab)	Forest communities report plan due Friday, 22 Sept

Date	Notes[†]	Activity	Individual assignments[‡]	Group assignments
Week 4: 25 Sept	comp	Statistics tutorial part 1; start data analysis exercise	Quiz #4 – lab report format (online)	
Week 5: 2 Oct	comp	Forest communities: data analysis for forest measures (using Excel); plan report	Data analysis exercise due	Forest communities data analysis due Friday, 6 Oct
9 Oct		FALL BREAK – no lab		
Week 6: 16 Oct	comp	Forest communities: Group presentations on forest community project; introduction to soil CO_2 emission project; statistics tutorial part 2		Presentations due in lab; group written report on forest communities due Friday, 20 Oct
Week 7: 23 Oct	FW	Soil CO_2 emission: **field trip** to locate sites in Research Reserve; site description, develop hypotheses	Quiz #5 – reading quiz (online; on Kricher pp. 414-436 and soil CO_2 emission lab handout)	Soil CO_2 emission lab report plan due Friday, 27 Oct
Week 8: 30 Oct	FW	Soil CO_2 emission: **field trip** to set up experiment & collect soil samples	Quiz #6 – reading quiz (online; on soil CO_2 emission experiment methods)	Groups return on their own 48-72 hrs after setup to retrieve soda lime jars
Week 9: 6 Nov	comp	Soil CO_2 emission: lab measurements, data analysis, plan report	Quiz #7 – statistics (in lab)	Soil CO_2 data analysis due Friday, 10 Nov
Week 10: 13 Nov	comp	Soil CO_2 emission: group presentations; introduction to leaf-cutter ant foraging project; develop hypotheses and explore literature		Presentations due in lab; group written report on soil CO_2 emission due Friday, 17 Nov
Week 11: 20 Nov	comp	Leaf-cutter ant foraging: collect data from images/videos	Quiz #8 – reading quiz (online; on leaf-cutter ant ecology)	Leaf-cutter ant foraging project plan due by end of lab
Week 12: 27 Nov	comp	Leaf-cutter ant foraging: collect and analyze data from images/videos		Leaf-cutter ant foraging data analysis due Friday, 1 Dec
Week 13: 4 Dec	comp	Leaf-cutter ant foraging: group presentations; work on reports		Group presentation due in lab; group written report on leaf-cutter ant foraging due Friday, 8 Dec

[†] **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; all online quizzes should be completed by 11:59 pm on the Sunday night BEFORE our lab meets.