Principles of Ecology Laboratory BIOL 204: Sections 01, 02, 03

Fall 2024

Wednesdays Section 01-11:30 am to 2:20 pm; Section 02-2:30 pm to 5:20 pm;
Thursdays Section 03-9:30 am to 12:20 pm

Course Overview

The Ecology laboratory is designed to complement the second-year ecology course, Prin- ciples of Ecology (Biology 203). Laboratories will consist of research projects that address questions at different levels of ecological organization, from organisms to populations, com- munities, 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, for- mulating hypotheses and predictions, designing experiments and strategies for data collec- tion, statistical and graphical analysis, interpreting results, and reporting findings in written and oral formats.

Course Details

Instructor: Wendy A Owens Rios
Email: wowens@geneseo.edu
Office Hours: Monday's 12 pm-1pm; Tuesday's 1pm-2pm & Thursday's 2-3:30pm. **Required text**: A Field Guide to Eastern Forests by John Kricher (Houghton Mifflin, 1998; ISBN: 978-0395928950)

Learning Outcomes

Upon completion of this course, successful students will be able to:

- Make observations, generate hypotheses, and carry out simple experiments and/or col- lect 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 infor- mation 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.

Course organization & Grading

All the labs that we will be working on will build upon each other. Your assignments will be divided between individual and group assignments. There will be no quizzes only written assignments, R assignments, and one presentation with final lab report. Each week we will focus on one aspect of the ecosystem. We will be collecting data at the Research Reserve starting with herbaceous plants, tree data, soil characteristics and leaf-litter insects. The final two weeks, we will do a data assignment using all the skills in R you learned to better analyze the data.

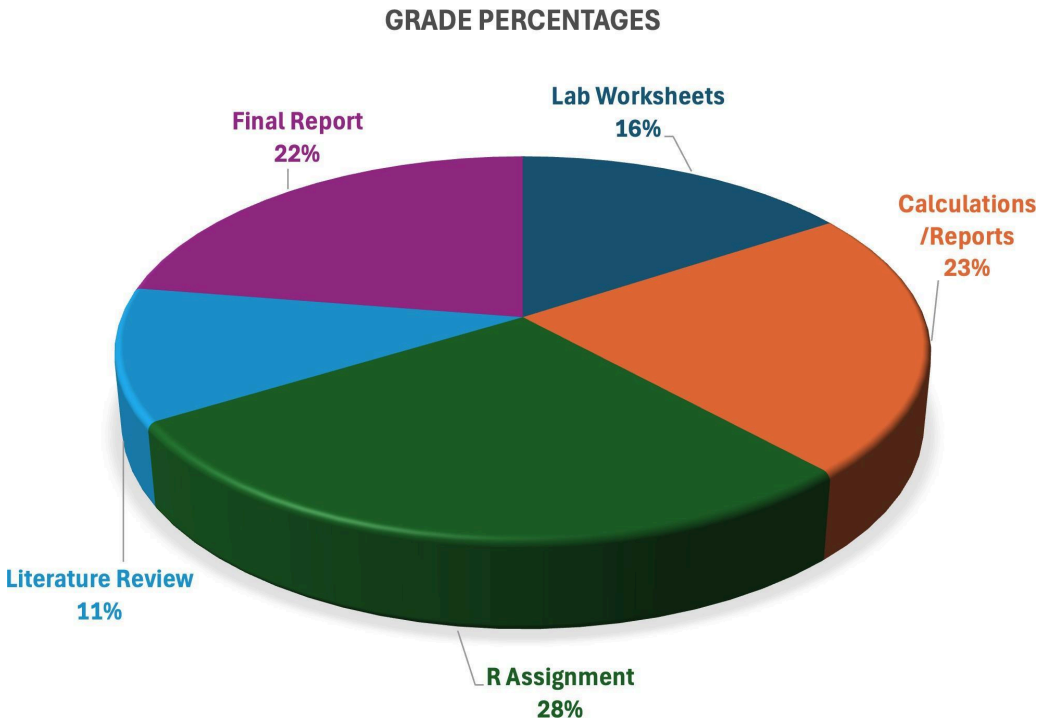

Figure 1: Grades

Table 1: Assignment Details

Assignment	Group or Individual	Assignment Category	Points	Format
Arboretum Plants	Individual	Lab Worksheet	20	Handwritten & Typed
Research Reserve plants	Individual	Lab Worksheet	20	Handwritten & Typed
Forest Communities	Individual	Lab Worksheet	20	Handwritten & Typed
Soil Carbon	Individual	Lab Worksheet	20	Handwritten & Typed
Leaf Litter	Individual	Lab Worksheet	20	Handwritten & Typed
Soil Characteristics	Individual	Lab Worksheet	20	Handwritten & Typed
Diversity Calculations	Group	Calculations/Report	50	Handwritten & Typed
Soil Characteristics/Carbon	Group	Calculations/Report	50	Handwritten & Typed
Forest Communities Calculations	Group	Calculations/Report	50	Handwritten & Typed
Leaf Litter Calculations	Group	Calculations/Report	50	Handwritten & Typed
Intro to R	Individual	R assignment	50	R code
Using R with Diversity	Individual	R assignment	100	R code
Using R with Non-parametric	Individual	R assignment	100	R code
Data Lab-Intro	Individual	Lab Worksheet	20	Handwritten & Typed
Data Lab Calculations	Group	Calculations/Report	70	R code, Typed
Literature Review-List	Group	Other	20	Typed-APA format
Annotated Bibliography	Individual	Other	20	Typed-APA format, handwritten notes
Research Reserve Presentation	Group	Final	100	PowerPoint
Research Reserve Report	Group	Final	100	PDF/Word document

Table 2: Lab Activities and Assignment Due Dates(subject to change

Week of	**Lab Activity**	**Assignment Due**
August 26th	Plant surveys in Arboretum	Datasheet submitted to Google Drive
September 2nd	Plant surveys at Research Reserve	Arboretum Worksheet/Intro to R/Research Reserve Datasheet
September 9th	Forest Communities	Research Reserve Worksheet/Forest Community Datasheets/Diversity Calculations
September 16th	Soil Sampling and Soil Carbon set up	Forest Communities Worksheet/Soil Characteristic Datasheets
September 23rd	Collect Soil Carbon/Collect Leaf Litter	Soil Characteristic Worksheets/Leaf Litter Datasheets
September 30th	Leaf Litter set up for insects/Analyzing Forest Communities	Forest Communities Calculations
October 7th	Identify Insects, Calculate Diversity/Assign Lab Report Topics	Leaf Litter Worksheet
October 14th	Soil Analyses/Carbon	Leaf Litter Calculations
October 21st	Soil Analyses/Intro to Literature Review	Soil Characteristic Calculations
October 28th	Soil Analyses	List of Literature, Annotated Bibliography
November 4th	Report Writing	Rough Draft Due
November 11th	Presentation - Assign Components by Group	Presentation
November 18th	Data Lab	Final Lab Report
December 2nd	Data Lab	Data Lab

Assignment Submissions

All assignments will be submitted via Brightspace. Worksheets will be handwritten and you may take a photo of your written work to submit. In this age of AI, it is important that you are submitting your own work. You will be working in groups therefore I understand similar work will come from group members. You will also submit typewritten answers into Brightspace based on your field notes. The R assignments, submissions will be the .RMD file and knitted document either in Word or as PDF (depends on how you are knitting the document). Full credit will only be allowed if both files are submitted. There will be a rubric attached to each assignment to make sure you complete all the requirements to get full credit.

Lab Worksheets

Each lab exercise will have a worksheet where as individuals, you will fill out after each lab exercise to turn in. They will have questions related to the topic and you will be able to find answers in the lab exercise handout or I will direct you to resources to help you answer the questions. These worksheets will be completed by hand but also you will neatly type the answers in Brightspace to make it easier to grade. Therefore each assignment will have two submissions, your scanned written worksheet and your typewritten answers. Though, you will be working in groups I expect that each of you take time to write your own answers.

Calculations and Reports

There will be 5 calculations or report assignments worth 50 points each submitted as a group. These will include your .RMD files, knitted R files, scanned copies of calculations, and written results paragraphs that I will give you a rubric on how to complete these.

R Assignments

There will be 3 R assignments each worth 100 points. For full credit, you will submit a .RMD file and a knitted file either in word or pdf. Each assignment will have an attached rubric. These are individual assignments.

Literature review

For the final presentation and report, you will need to do a literature review of relevant peer review articles to include as citations in your final paper. This is a group project to create a relevant list. Individually, you will choose one of those articles to do an Annotated bibliogra- phy

Final Report and Presentation-Group

Each group will be assigned a portion of the total Research Reserve data collection to analyze and write up a scientific report and will present their results to the rest of the class. Each of these are 100 points each and I will request rough drafts.