Syllabus for Principles of Ecology (BIOL 203)

Fall 2023

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"Any fool can know. The point is to understand." Albert Einstein

Course item	**Details**
Meetings	Tues/Thur 9:30 - 10:45 and 11:00 - 12:15, Schrader 1
Dr. H's contact info	ISC 360 (office); hartvig@geneseo.edu.
Office hrs	Mon. 11:00am – 12:00pm (Zoom only); Tues. 8:00am – 9:00am (ISC 360); Wed. 10:00am – 11:00pm (Zoom only). For Zoom meetings join me here: `https://geneseo.zoom.us/j/4333683209`, passcode = 497118). For details see Section 8 on page 11.
Textbook (free)	*The Science of Ecology*, Hartvigsen (2023). PDF in my OutBox
Optional textbook	*A Primer in Biological Data Analysis, 2nd ed.* (Hartvigsen, 2021) if you want more details for using **R**
Laptop computer (Mac, Windows, or Linux)	A few times you will be asked to bring this to class. A Chromebook will not be sufficient to complete exercises in this class (see `https://wiki.geneseo.edu/display/cit/Student+Laptop+Requirement`).
Software (all free)	**R** (version 4.3.1 or later), `RStudio` (version 2023.06.1 or later), `Excel` or similar, and a PDF reader.
Cloud storage (free)	You are expected to keep all files from this class in a folder that automatically syncs in the cloud. This can be through "Google Drive" (recommended), Dropbox, OneDrive, or iCloud. This protects you from having to utter the words "I lost my work because my computer died."
Calculator ($\leq$ \$10)	It must be able to do $ln()$ and e^x. New batteries. You will be disappointed if your calculator is DOA at an exam.
Stapler	Your homework assignments must be stapled - not a set of loose papers.

Note: ALL COURSE MATERIALS WILL BE EMAILED TO YOU AND MADE AVAILABLE IN MY OUTBOX, NOT BLIGHTSPACE! I also will email materials to your Geneseo account.

> ***definition***: Ecology is the scientific study of the interactions between living things and their total environment (biotic and abiotic). Page 13, (Hartvigsen, 2023).

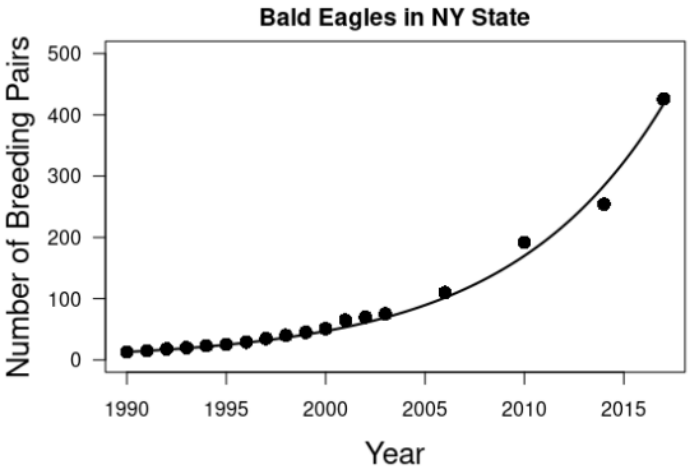
1 Overview

I will work to provide you an introduction to this broad area of science. If you read any news source you're likely to quickly find an ecological challenge facing humanity, such as global climate change, the extinction risk of a species, human conflict over limited resources, or the emergence and spread of an introduced species or even human disease agent (e.g., SARS-CoV-2). All of these are problems

of ecology. My goal is to help you enhance your interest and understanding in ecology and gain the ability to better assess scientific information.

As a heads up to you I received this on a recent student evaluation: "Hartvigsen just shows data and math and nothing else." Well, that's not true but it might seem that way. Below it's nice to recognize that the image is of a bald eagle (*Haliaeetus leucocephalus*) but you probably knew this. Now it's time to ask, and answer, more complicated questions like "how is the population changing?" "Is it's rate of increase *significant* (which means it's different than just bouncing around randomly)?" "If it's changing, what is the *annual rate of change*?" And "can we predict what the population will be in the future?" These questions are answered with data, math, statistics, and an understanding of the principles of ecology. The answer is that the number of breeding pairs is increasing exponentially in NY State. And, instead of asking you to believe me, I support this conclusion with a beautiful graph and some objective math and statistics ($F = 3656$; $df = 1, 16$; $p < 0.001$; $R^2 = 0.9954$; $N_t = 13 * e^{(0.1285 \cdot (yr - 1990))}$). That's about 13.7% year^{-1} since 1990! Note that $e^{0.1285} = 1.137$.

Eric Frommer, Creative Commons



Ecologists might be accused of missing the beauty of nature, such as the bald eagle, by reducing it to some numbers. I hope you see that, as an ecologist, you are able to enjoy the beauty of nature just as well as any poet or artist. However, knowing more about it, such as the evolutionary history, the role the eagle plays in food webs, and how the number of breeding pairs changes over time, greatly extends one's appreciation of nature, and does so far beyond what any poet or artist can enjoy.

2 Expected Learning Outcomes

If you work effectively and succeed in this class you can expect to be able to:

1. **explain** how ecologists use the scientific method to derive evidence-based understanding and prediction of ecological phenomena;
2. **explain** a variety of patterns in nature using a broad array of ecological principles, including how organisms deal with the physical environment, how species evolve over time, particularly via the process of natural selection, how the sizes of populations change over time, and how species interact with each other;

3. **apply quantitative methods**, particularly using the **R** statistical and programming language and mathematics, to achieve better understanding and predictions of ecological systems;
4. **correctly interpret** scientific information, particularly when presented graphically;
5. **explain** your role, and humanity's role, in affecting the environment through your use of natural resources;
6. **explain** the role of ecology in our pursuit of environmental justice;
7. **correctly explain** the difference between evidence-based information from evidence-free conspiracy theories, beliefs, and opinions;
8. **actively engage** with fellow students in discussions involving ecological principles.

3 Course Resources

1. **Dr. H.** Please recognize that I am a member of your academic success team. It's not you against me. It's you and me working to understand the principles of ecology together. I do write the exams so you should ask me how I do it (and read about this below in section 6 on page 8). If you have questions join me during office hours.
2. **Provided Information**. I provide pre- and post-lecture notes, the textbook, all old exams I've ever given in this class, **R** code and data, and descriptions of homework assignments through my OutBox. See `https://geneseo.atlassian.net/wiki/spaces/HELP/pages/76778990/Inboxes+and+Outboxes`. Note that on Macs the "Go menu" is in Finder. Be sure to go to my "Outbox," not my "Inbox." I am not providing any information through Blightspace (see "What's my grade" on page 4).
3. **This syllabus**. It's long and detailed. It has dates, expectations, helpful advice, and guidance for assignments. It is meant to help *you succeed*.
4. **Lectures**. These are generally important to catch. I try to present information that will be useful to you (on the exams and instructions for assignments). Not everything will be on the exam – there's too much. I will work to provide you "pre-lecture notes" in my OutBox that you can pull up at the beginning of class. There will be "post-lecture notes" within 24 hrs (if not, send me an email!). The slides are NOT self-explanatory. They will mostly only make sense if you attended the lecture. Recent student comment: "The post-lecture note slides don't have any words on them so they don't make sense if you miss lecture."
5. **Textbook**. The latest draft of The Science of Ecology is available in my OutBox. Note the textbook has three appendices supplying help with **R**. There's a fourth that lists "Principles of Ecology." You're responsible for those.
6. **Office hours**. These are times set up so I can help you. If you're having trouble others are probably have challenges, too. Join us.
7. **Software**. Here are the software programs you'll need to succeed in this class. All are free. If you already have **R** and/or `RStudio` then install the latest versions of these – they change monthly.
   (a) `Excel` (or a look-alike). Free for matriculated students.
   (b) **R**. Free. Go to `http://cran.case.edu/` and get the latest version for your computer.
   (c) `RStudio`. Free front-end for **R**. Install after you install **R**. Go to `https://www.rstudio.com/products/rstudio/download/#download` and choose the version for your operating system under the "Installers for Supported Platforms" heading.
8. **Fellow students**. During class you'll be given opportunities to work with neighbors to discuss

questions posed during class. Hopefully you'll make some connections that might lead to study partners. You don't have to interact with anyone if you don't want to - this is up to you and you may ignore my encouragement to mingle.

9. **Email**. You are responsible for information provided to you via your Geneseo email account from me. This is the most effective way to reach me outside of office hours. Note that you **must use** only your `@geneseo.edu` account when sending me an email. Otherwise your message may be marked as spam and I may not get it. I will not be using Blightspace.
10. **Past exams**. Every exam I've given in this class since 1998 is available in my Geneseo "Outbox." For help on finding boxes see https://wiki.geneseo.edu/display/cit/Inboxes+and+Outboxes.
11. **"What's new?"** Each lecture begins with this question. Please check out the news and share. Here are several great sources:
    (a) http://www.sciencedaily.com/,
    (b) http://www.sciencemag.org/news,
    (c) http://www.nature.com/news/,
    (d) https://www.nationalgeographic.com/latest-stories/.
    (e) https://www.livescience.com/.
12. **Additional SUNY Geneseo resources**. See `https://wiki.geneseo.edu/display/PROVOST/Syllabus+Resources+Related+to+Student+Success`.

4 Grading stuff

The following table shows the breakdown for points.

Item	Number	Points for each	Total pts
Ecological Explorations (EE)	2	10	20
Ecological Applications (EA)	2	20	40
Exam 1	1	20	20
Exam 2	1	40	40
Exam 3	1	50	50
Exam 4 (optional final)	1	10	10
Total			170/180

"Ecological Explorations" (EE) are shorter homework assignments (see section 5.1 for details). "Ecological Applications" (EA) are longer homework assignments that are quantitative applications of data and/or models to understanding ecological principles (see section 5.2 for details). All assignments are due at the beginning of class. These accrue a late fee of 25% (2.5 pts for EEs and 5 pts for EAs) per 24 hrs late. If you can't make it to class that day you must provide evidence of an official excuse (e.g., from Lauderdale) and email the assignment as a pdf before class begins. I will not accept a Google Doc link - you must send the document as an attached pdf. Note: Printers are usually down right before class so plan ahead. Printing 5 minutes before class represents extremely risky behavior. We will spend ∼10 minutes or so discussing in groups what you found.

The final exam (4) is optional. If you take it the points you earn will be added to your total (numerator) and 10 points will be added to the number of possible points you could earn (denominator). If you do not take the final it will not hurt your grade. If you take it your score can help or hurt your overall grade (but not by much). To determine the value of this opportunity please use your "`What is my grade.r`" script file to model the effects of getting a 0 or 100% (see next section).

What's my grade in this class?

We are not using Blightspace in this class. Instead, you will find in the folder `OutBox` → `PoE` → `R files and data` an **R** script file called "`What is my grade.r`" (see Course Resources, section 3 on page 3 to learn how to get to my OutBox). Use this to maintain your grade in the class. If you're not sure or want to verify your grade please come by any one of my office hours.

The exams and Ecological Explorations (EE) homeworks are usually returned the next class meeting. Ecology Application (EA) assignments take about a week to return. The EE and EA assignments come with a rubric in the descriptions and have a completed one attached to your graded assignments. I go over the exams in detail the day they are handed back. If you miss the classes when things are handed back you'll have to pick them up in my office on Wednesdays. **It is your responsibility to ensure the test/assignment grades are accurate**. You have just one week to appeal a grade after I hand either an exam or assignment back to the class.

I will use the following numerical ranges of your *proportion* of earned points to determine your letter grade:

Score		Letter Grade		Score
0.933	$\leq$	A		
0.900	$\leq$	A-	$<$	0.933
0.867	$\leq$	B+	$<$	0.900
0.833	$\leq$	B	$<$	0.867
0.800	$\leq$	B-	$<$	0.833
etc.				

Note that I will round your final grade, as a proportion proportion of points earned, UP to three decimal places using `Excel`'s function `CEILING(number, 0.001)`. I also do this in your "`What is my grade.r`" script file. The college rounds grades DOWN (truncates) when calculating your GPA. See the worked example in the Bulletin which shows a student getting 38.2 "quality points" in 14 credit hours of course work. That should be 38.2/14 = 2.728571, however they *truncate* that to 2.72. To help counter this injustice I will take a grade of, say, 0.832105, which would be a B-, and round it up to 0.833, making it a B.

5 Homework Assignments

5.1 Ecological Explorations (EE, 10 pts each; 20 pts total)

These are assignments that are planned as two-part experiences. The first part involves completing the assignment which you bring, printed out, on the day each is due (see schedule in section 7). The second part of the assignment involves sharing in groups what you found. Note: these must be printed out responses, not hand written.

5.2 Ecological Applications (EA, 20 pts each; 40 pts total)

We will explore a couple of in-depth applications of methods used by ecologists to understand more complex problems. These include working with data and modeling. Galileo is attributed as saying that Nature is written in the language of mathematics. We are studying nature and it is best understood using quantitative approaches. Fortunately, you've been studying mathematics for years and this will help you understand complex biological systems. In particular, these applications are designed to help you explore Nature more deeply.

If you find working with your laptop and using math and statistics challenging then plan accordingly. In this class we will see data, statistics, and output from models on most days. These application exercises, however, are opportunities for you to gain this fundamental skill in science.

5.2.1 General instructions

1. For full credit you need to hand in a printed, paper version of the assignments in class on (or before) the day they are due (see the schedule on page 9. Handing them in after the due date/time is considered late (e.g., coming late to class with it is late). See item #12 below.
2. So here are some ways to lose points before I grade these:
   (a) -25% for each 24 hr period handed in late. Note that emailing it to me at noon on the day it is due is the wrong way to hand it in (see next item) and is late by falling within the first 24 hour late period. If I find it under my door after I return from class it is considered late.
   (b) -25% for emailing assignment on time and making me print it for you (unless pre-approved).
   (c) -10% for no staple.
   (d) -10% for including a title page
   (e) -10% for not printing double-sided.
   (f) -100%? Do not put it in my office mailbox. I rarely check that so many days may go by before I find it, rendering it very late.
3. Each assignment will have its own set of instructions with a rubric. Additionally, each assignment is introduced in class. Missing these instructions could be costly. Read the directions carefully, complete the assignment, then re-read the instructions before handing it in.
4. Your write up can be short if you complete all required tasks (no rewards for being long-winded).
5. Use only complete sentences - poor writing and/or typos can cost you.
6. Include your name, date, and assignment name at the top of the front page (not a title page!).
7. Use single-spacing, double-sided printing for your write up.
8. Your report should be structured in numerical order to match the numbered questions. Answer each question with any graphs and code before starting the next question.
9. If required include code you have written or modified (omit code I provided). It must be your own code so that, if asked, you could tell me what it all does. Do not try to find code online that you think solves your problem but you have no idea what it does. Feel free to refer to code that you have provided in a previous answer to avoid including the exact same code twice. Do not include screen shots of your code!
10. When using external literature provide complete citations. Citations for "scientific papers" (which are primary literature papers) look like this:

Lastname-of-author, initials, (other authors listed with initials, lastname). Year. Title. Journal. Volume(issue): pages.

11. All work must be your own. You also 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 property of others. Feel free to review College's policy on academic dishonesty.
12. **Finally, know yourself and accept yourself!** You probably know if using **R** challenges you, papers are hard to write, you tend to hand assignments in late, or you often have other challenges. So, be your own best ally. If you're healthy then it's probably good to get to work - you might not feel well the night before so that plan to pull an all-nighter might not work out. Be sure to use your resources (see above). So, I'm not really saying "plan ahead." It's more like "assume the plan will change so plan for the unplanned."

5.3 Getting help on the Ecological Application Assignments

For these assignments I believe in you! I know you can complete these successfully if we work together. My job is to give you all the information you need to succeed and to provide office hours to answer questions you have. Here are suggestions on how to proceed get help.

1. Read the directions. I've spent a lot of time writing the directions to these assignments. Did you start at the beginning? Frequently I've had students go straight to the questions and get stuck. Suffering with **R**? Did you work through the Appendices in your textbook? They're there to help you if **R** boggles you. Finally, don't stare at an error message for hours (I've heard this often!). If you can't get it after 5-10 minutes of using your **R** resources then move on to the next tips.
2. Come to my office hours ready to explain your challenge. Have the **R** script file open on your computer with the cursor on where you're stuck. It'll probably be a quick visit.
3. Carefully draft an email of your question. Send your **R** script file as an attachment (not copied into the email and NEVER send a screen shot!). Indicate the line number in the script file that's giving you trouble. If the code reads in a data file send the data file, too. I will run your code and see the exact same error message and will likely be able to tell you how to fix the problem.

Note that Dr. H. is unlikely to answer questions during darkness or on the morning the assignment's due.

5.4 Using your computer

To complete work in the field of ecology you must be able to complete basic operations on *your* computer. This includes the following skills:

1. create a folder for this class, such as "PoE Fall 2023";
2. download a file from the internet (e.g., my OutBox) and move it to your PoE folder;
3. install, run, and use MS `Excel` (and maybe Word), **R**, and `RStudio`;
4. use your textbook's appendices (there are three dedicated to **R**).

6 Exams

The content covered by the four exams is cumulative. Any material covered before an exam can be included on the exam. Note that the exams increase in their weight. This is because, as with all classes, figuring out how someone is assessing your knowledge can be its own learning experience. Be sure to read about the availability of old exams in item 6 below. Here are some thoughts on these for this class.

1. **How I write exams**. When I write these I do it mostly from scratch. Many questions will be similar to questions on old exams (and sometimes identical by mistake!). I write the exams using the readings, post-lecture notes, and the homework assignments. Stuff I discuss (e.g., "what's new?" stuff) is also material you can be rewarded for knowing. I also write questions based on meetings where no notes were provided (e.g., the trip to the Arboretum and when only the board is used).
2. **What to bring**.
   (a) Probably bring a pencil so you can erase. Crossing out gets messy. You have just enough room to answer questions once.
   (b) Bring your calculator with fresh batteries. You may borrow these from people before exams but **NOT** during exams.
3. **No bathroom breaks?** During all exams there are no rest breaks (you won't have time). Prepare yourself to be comfortable. This has evolved out of prior experiences where folks have created unfair advantages for themselves.
4. **The Final Exam**. This is optional and worth 10 points. It's a chance to touch up your grade. If you elect to take this the points earned will be added to your grade and 10 points will be added to the total number of points possible. It will likely be a few questions that synthesize your understanding of the principles of ecology. Use your "`What is my grade.r`" script file to assess what different grades on this final might do to change your grade up or down.
5. **Missing an exam**. Missing an exam is a big deal. I am happy to work with you if you keep me informed with an **email notification before** the exam and I receive from you evidence of your reason for missing class (e.g., notification from the health center).

   But what if you can't make it because you're barfing that morning? Email me and tell me you're going to the health center instead. Afterwards, email me evidence that you saw them. It is your responsibility to communicate with me about this. Appropriate excuses include illness with evidence of your visit to an appropriate professional or notification through the Dean of Students Office (Phone: 585-245-5706; Email: deanstu@geneseo.edu).
6. **Past exams** are provided in my OutBox in the PoE folder (see THIS WEBSITE to learn how to find Outboxes). I've tried to include both the test and the key. Please note that old exams may not reflect what your exam will look like.
7. **Emailing questions.** Feel free to send me an email. Only send this from your Geneseo account (else it might be lost in my spam folder and you'll think I don't respond to emails). You can send me a screen captured image of a lecture slide or past test question and ask something specific about it. Never send a screen shot of **R** code (send the code)! The clearer the question the more helpful I can be. A question like "can you explain what the slide says?"

is too vague and can't be answered by email. Please bring these types of questions to office hours. I won't be able to respond to questions the evening before or morning of an exam (or the day a homework assignment is due). Please plan ahead!

6.1 Want to Crush the Exams?

Be your strongest, most consistent and honest ally. So, **study like you're taking an exam**. Each study session should be no longer than the length of the exam for which you are studying. You probably know you wouldn't do your best on an exam by constantly checking your phone, texting friends, and listening to music. Treat your study time with the same intensity/respect as when you are taking the test. Studying, therefore, should be tiring. It's just as important to take an awesome break between study sessions. Treat studying like a professional athlete who trains effectively and peaks at an event (the test). They do NOT prepare for an event by simply pulling an all-nighter. Also, get that sleep you have heard so many times as being important. And eating well is really important. Eat like you're training for a race - don't fill up on comfort junk food (donuts?) before a big exam. All I'm really suggesting is that you use what biologists have taught us. I know professional athletes are listening to the biologists - you should, too!

Additional thoughts

1. ***Work through old exams***. Do not gloss over keys. Keys can help you check that you got the right answers.
2. ***Create questions from post-lecture notes***. What would Dr. H. ask on each slide? Don't just say "yeah, I get that" to a slide - that won't help you.
3. ***Actively participate in your study group***. Create questions for each other. Discuss how you would answer these questions. Don't let each other off the hook when an answer is not clear.
4. ***Be bold and ask Dr. H. for help***.

7 Schedule

The following is the semester plan. Topics might shift in the schedule but the due dates for homeworks and exams are correct. For exams you're responsible for all material covered before (they are cumulative).

1. EE = Ecological Explorations (see section 5.1).
2. EA = Ecological Applications (see section 5.2).
3. Readings are from the textbook The Science of Ecology (pdf in my OutBox).

Date	Day	Topic	Do/Due/Bring
8/29/2023	Tue	Introduction to Ecology. Introduction to EE #1	Read Preface + Chapt 1
8/31/2023	Thu	Adaptations in the Field. Meet at gazebo in the Roemer Arboretum. Check weather & wear appropriate clothes!	Review the Roemer Arboretum's mission on it's website.

9/5/2023	Tue	Evolutionary ecology and three models of evolution	Read Chapt. 2. Bring laptop with R and RStudio working. Have worked through textbook appendices A + B.
9/7/2023	Thu	EE #1 discussion. The Physical Environment (part 1).	EE #1 due. Read Chapt. 3
9/12/2023	Tue	The Physical Env (part 2). Introduction to EA #1	Bring laptop.
9/14/2023	Thu	Orgs in the Physical Env	Read Chapt. 4.
9/19/2023	Tue	Intro to Population Ecology	Read Chapt. 5.
9/21/2023	Thu	Unregulated growth	Read Chapt. 6.
9/26/2023	Tue	Structured population growth	Read Chapt. 7.
9/28/2023	Thu	EA #1 Discussion. Regulated Growth	EA #1 due. Read Chapt. 8.
10/3/2023	Tue	Behavioral Ecology	More with Chapt. 9
10/5/2023	Thu	Exam #1	Be prepared for Assessment #1
10/10/2023	Tue	October Break	
10/12/2023	Thu	Behavioral ecology + game theory.	Read Chapt. 10. Bring laptop
10/17/2023	Tue	Metapopulations	Read Chapt. 10
10/19/2023	Thu	Metapopulations + Competition	
10/24/2023	Tue	Competition Model on board	Read Chapt. 11.
10/26/2023	Thu	Competition + Herbivory. Introduction to EE #2	Read Chapt. 12.
10/31/2023	Tue	Herbivory + Predation	Read Chapt. 12 + 13.
11/2/2023	Thu	Exam #2	Be prepared for Assessment #2
11/7/2023	Tue	Predation model on board	Read Chapt. 13.
11/9/2023	Thu	EE #2 discussion. Predation + Parasites, Parasitoids	EE #2 Due. Read Chapt. 13 + 14
11/14/2023	Tue	Pathogens + Mutualism, Commensalism, + Amensalism. Introduce EA #2	Read Chapt. 14.
11/16/2023	Thu	Mutualism + stuff +Trophic interactions (food webs)	Read Chapt. 15 + 16.
11/21/2023	Tue	Trophic interactions	Read Chapt. 16
11/23/2023	Thu	Thanksgiving Break!	
11/28/2023	Tue	Spatial and temporal community dynamics	Read Chapt. 17.
11/30/2023	Thu	EA #2 Discussion. Spatial and temporal community dynamics	EA #2 due. Read Chapt. 17.
12/5/2023	Tue	Biodiversity + The Theory of Biogeography	Reac Chapt. 19 + 20
12/7/2023	Thu	Exam #3	

12/18/2023	Mon	Exam #4. 11:00 section final from 8:00 - 10:30am	Be prepared
12/19/2023	Tue	Exam #4. 9:30 section final from 3:30 - 6:00pm	Be prepared

8 Zoom Office Hours

Most of my office hrs are over Zoom (`https://geneseo.zoom.us/j/4333683209`, passcode = 497118). I only have 40 minutes of zoom time so it will end and then I will restart Zoom. If you get cut off, just come back. We may switch to Teams but I find that platform unpleasant. You might not get in right away because I'm with someone who wants a private conversation and so I'll let you in as soon as I can. If you can't wait send me an email with your question. In preparation for a zoom meeting you will be able to share your screen so you should get your questions ready before entering the zoom call.

9 Religious observances

It is my responsibility, as outlined in the College's Undergraduate Bulletin, to accommodate religious observances. No exams have been scheduled to occur on notable observance days. However, as stated in the 2017-2018 Bulletin, I am "to comply in good faith with the provisions of... " section 224-a of the Education Law of New York State. I am happy to meet your needs if you inform me of any such absence at least one week prior to the conflict. Without you providing me this information I will not be able to help you meet your learning expectations for this class.

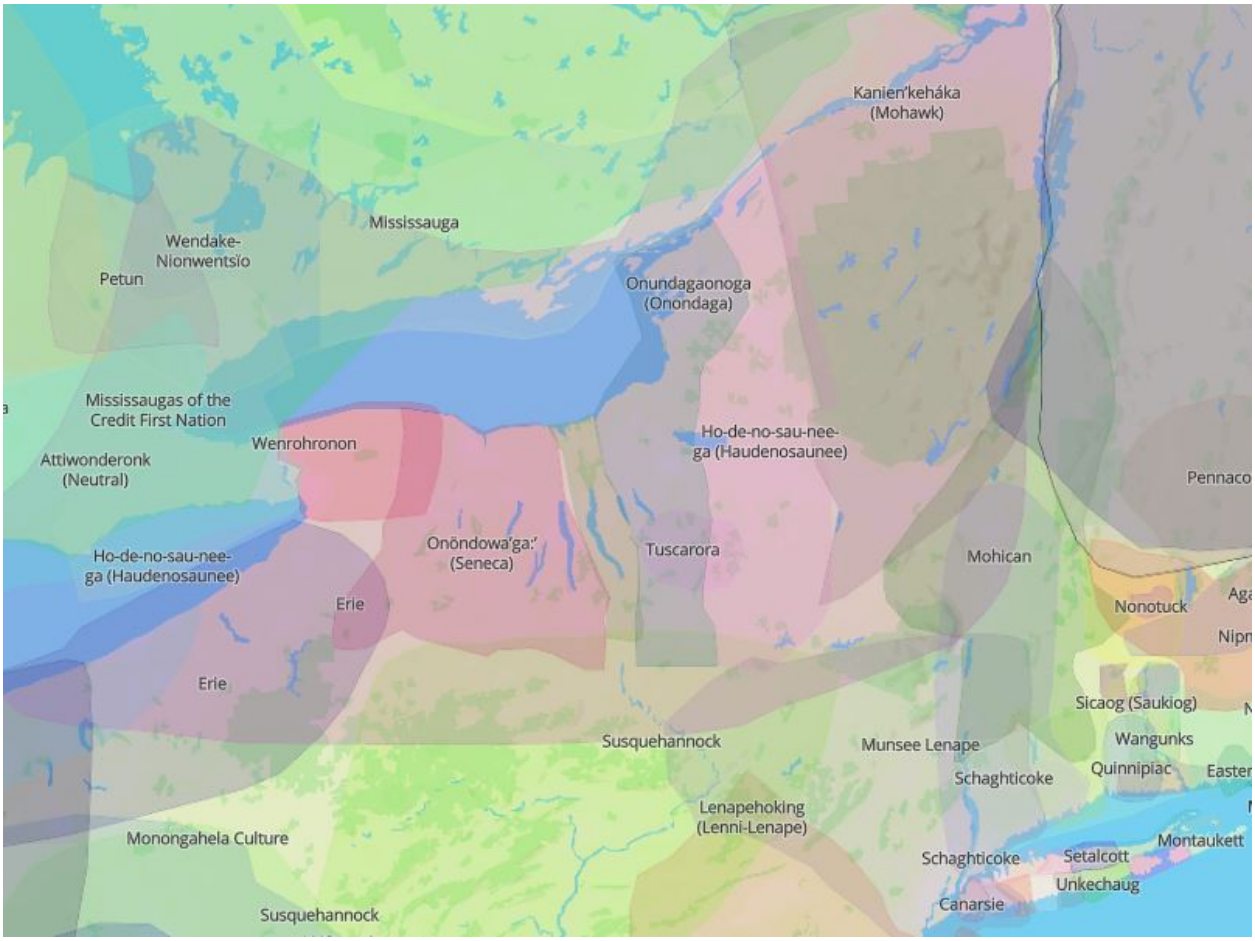
10 Accessibility challenges

I will do my best to make reasonable accommodations for students with documented physical, emotional, or cognitive disabilities. In addition, I will do my best to accommodate challenges brought about through pregnancy, parenting, or care giving. Students should contact the Office of Accessibility Services (585-245-5112) and me to discuss needed accommodations as early as possible. I am happy to accommodate your needs for completing exams in the Test Center (`https://www.geneseo.edu/is/testcenter/main`) during class time, noting that you need to inform me of this at least one week in advance.

11 Land Acknowledgment

As members of our community that work to better understand the ecology of our Earth, it's important to acknowledge that Geneseo resides on the homeland of the Seneca Nation of Indians and Tonawanda Seneca Nation. We should all work to learn more about these original occupants and those indigenous to other places we have lived and visited. We can turn to the "Native Land" app and/or the website `https://sni.org/` to learn more about the community of more than 7,000 enrolled Indigenous Peoples.

Below is an image of the different groups of people that resided in and around Geneseo. This can be found at the website `https://sni.org/`.



References

Hartvigsen, G. 2021. A primer in biological data analysis and visualization using R, 2e. Columbia University Press.

Hartvigsen, G. 2023. The science of ecology. Provided PDF.

Far Side. Gary Larson