

NR 319 – Introduction to Geographic Information Systems

SYLLABUS - SPRING 2024

Department of Ecosystem Science and Sustainability | Warner College of Natural Resources

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GENERAL INFORMATION

Instructor: Elizabeth Tulanowski Email: E.Tulanowski@colostate.edu

- Office hours/ Lab help: M / W at 10-11am and Tues 1:30-2:30pm in [NESB A126B](#)

Teaching Assistants:

Aylin Barreras (aylin.barreras@colostate.edu)

- Office hours Monday 2-3pm WCNR Bldg, Rm. 224; Thursday 3-4pm in WCNR Rm. 230/231

Jack Reuland (jack.reuland@colostate.edu)

- Office hours Fridays 11am – 12pm in WCNR Rm. 230/231

Billy McLean (billy.mclean@colostate.edu)

- Office hours Mondays 11am-12pm in WCNR Rm. 232 (East)

Open lab: (lab help session for anyone) Mondays 11am – 1pm in WCNR Rm. 232 (East)

Scheduled Class Meeting times:

Day & Time	Room (note West or East side of Rm. 232)	Lab Section
Tues. 8:30am - 11:50am	WCNR 232 West (w/ Elizabeth)	L08
Tues. 11:30am - 2:50pm	WCNR 232 East (w/ TA Billy)	L01
Tues. 4:00pm - 7:20pm	WCNR 232 West (w/ TA Aylin)	L09
Wed. 11:00am - 2:20pm	WCNR 232 East (w/ TA Jack)	L02
Wed. 2:30pm - 5:50pm	WCNR 232 East (w/ TA Aylin)	L03
Wed. 5:00pm - 8:20pm	WCNR 232 West (w/ TA Billy)	L10
Thurs. 9:00am - 12:20pm	WCNR 232 East (w/ TA Jack)	L04
Thurs. 5:00pm - 8:20pm	WCNR 232 East (w/ TA Aylin)	L05
Fri. 8:00am - 11:20am	WCNR 232 East (w/ TA Billy)	L06
Fri. 12:00pm - 3:20pm	WCNR 232 East (w/ TA Jack)	L07

Course Description (official)

Fundamental concepts of geospatial data, including structure, coordinate systems, sources, and principles of map design. Applications and methods for spatial analysis using vector and raster data, and remote sensing techniques.

Course Objectives

This course is designed to introduce students to **geospatial science**, an overarching set of principles and technologies that encompasses Geographic Information Systems (GIS), remote sensing, web mapping, field data collection, data management, and more. The purpose of the course is threefold, to:

- 1) Examine the broad context in which geospatial science is used;
- 2) Understand core geospatial principles such as data models, coordinate systems, digital cartography, data acquisition and creation, remote sensing, and spatial analysis techniques;
- 3) Gain hands-on experience using GIS software and methods to manipulate vector and raster data, including satellite imagery, and solve spatial problems.

COURSE MATERIALS

Recommended Text: Paul Bolstad, **GIS Fundamentals, 7th Edition**. (6th Ed. ok, but page numbers may differ)

This software-agnostic text provides a good overview and necessary detail of the concepts we will be covering. Available digitally/print from the campus bookstore, [gисfundamentals](#) or [Amazon](#).

Relevant readings are found in the schedule at the end of the syllabus and embedded in lecture slides.

USB thumb drive: Highly recommended to store your lab data and files on, rather than relying on the WCNR network N:\ drive. *What size?* At least 8gb for this class's data and files

Software: This course will use **ArcGIS Pro v. 3.2** for nearly all the lab exercises.

Your options for accessing the software we need:

- Natural Resources building – Rm 232 classroom, and computer labs in Rm 231 and Rm 107
- Install ArcGIS Pro locally on your own **Windows** computer (**Not a Mac**. It doesn't work on Macs)
 - Download/installation instructions can be found on Canvas > Resources for ArcGIS Pro and in this [document](#).
 - Licensing is through an ArcGIS Online account that each student will receive.
- Use Remote Desktop to log on to a WCNR machine
 - Follow these steps from [WCNR Help page](#)
- Borrow a WCNR laptop. They have ArcGIS Pro installed.

Esri ArcGIS Online Accounts: Every student will have an Esri account created for them, for accessing online resources through [arcgis.com](#), [training.esri.com](#), and licensing ArcGIS Pro on your own machine.

Steps for logging in:

- From [ArcGIS Online](#) or ArcGIS Pro: (1) Click Your organization's URL - and type *csurams* to complete the URL and (2) Click **eid Login** and log in with your CSU credentials. *Do not make your own account!*

COURSE COMPONENTS

Lectures

- 50-minute lectures on Monday and Wednesday will focus on concepts, difficult topics, applications of geospatial, software demos, and interactive learning activities.
- Lecture slides with links to supplemental resources, as well as video recordings of the lectures, will be posted to Canvas and in Echo360.
- **Regular attendance is expected.** Attendance will be taken most days by way of short activities. You may miss up to 25% of lectures without penalty.
 - Your success depends on keeping up with course content, quizzes, and labs.
 - Class participation/engagement will be measured by lecture attendance, occasional homework, participation in chats, discussions, and office hours.
 - Do not come to class sick. Lectures are livestreamed/recorded on Echo360, as a backup. But **online attendance does not replace coming regularly in person.**

Labs

- 3.5-hour lab sessions each week provide review, demos, and hands-on exercises to gain proficiency with concepts and software. Lab exercises are designed as both **step-by-step and self-directed** styles. As the semester goes on, you will be expected to do more on your own with less “hand-holding.”
- **Lab exercises span two lab sessions**, and require a short lab **quiz** (on Canvas) after the first session, and a PDF **lab report** to be submitted (to Canvas) after the second session.
- **Lab quizzes and reports are each due by the start of your next lab session, and are accepted until the end of the day after that next lab session, with a 20% late penalty.** Labs not accepted after that without a valid excuse approved by the instructor. Check Canvas for due dates.
- You are expected to have or gain **access to a computer with the necessary software** to work on labs outside of class hours or remotely in case of illness or bad weather. Refer to the “Software” section above, or see the instructor if you need help with this.
- Point values for labs will vary slightly. Some “self-directed” labs are worth more points and will have little-to-no written instructions. We will do an overview at the start of those lab sessions.
- Regular attendance in lab is expected. You may have up to **3 unexcused lab absences** without penalty. We take attendance in each lab session.

Quizzes | Exams

- The lecture component of the course will use Canvas quizzes for assessment:
 - **12 short weekly quizzes** will be given on Canvas, as indicated in the schedule. They **are due by midnight every Sunday**, (with no-penalty grace period until 8am Mondays) and will cover the previous week’s material. These quizzes may be taken twice, the highest grade is retained. These quizzes typically take 15 minutes.
 - **3 Exams**, also on Canvas, throughout the semester. See the course schedule for dates. These exams may only be taken once, take an hour. Exam 3 will be open during finals week, May 8 -9, in lieu of a regular final exam.
- **Quizzes will close at 8am on Mondays, and are not accepted** after that without prior approval.

“Extra-curriculars”

Education is more than just what you learn in the classroom. Throughout the semester you are required to complete or attend (live or virtual) an activity outside of the classroom. See Canvas for the due dates.

- These activities will include things like: ([Link to document with list of options](#))
 - Read GIS articles and write up a summary
 - Complete an online GIS lesson or tutorial to make a map
 - Attend a GIS event: Mapathon, Seminar, workshop, webinar, Meetup, conference

GRADING

Category	Description
Lab exercises 46.5% / 465 points	8 lab exercises (Labs 0 -7 ; worth 15-60 points each) using GIS software to reinforce concepts and gain practical experience. Designed to be mostly completed during the 3.5-hour lab session. Some labs are more “self-directed.”
Final lab project 10% / 100 points	1 final, self-directed project to assess students’ understanding of techniques covered in exercises. Worth 100 points.
Quizzes and Exams 35% / 350 points	14 Canvas-based assessments to test your understanding of the readings and lectures. 11 “Weekly” quizzes, due Mondays at 8am, before the first lecture of the week. (12-15pts each). 3 Exams (worth 60-70 points each). Refer to the Schedule for dates.
Participation and Engagement 6.5% / 65 points	Students are expected to participate in lecture and lab, engage in class and demonstrate effort. Examples: attendance, asking questions, complete lecture activities, participate in discussions (live or online), attend office hours, good communication with instructor.
Extra-curriculars 2% / 20 points	GIS related activity to complete or attend outside of regular class time. Do 1 activity, 20 points. Document posted to Canvas with options and online here .
Total of 1000 points	

Final grades will be assigned using the following CSU grading scheme:

*I will only round up if you are within .4 of the next whole letter grade.

Grade	Score	Grade	Score
A+	99 - 100	B-	80-83
A	93.3 - 99	C+	77-80
A-	90-93.3	C	70-77
B+	87-90	D	60-70
B	83-87	F	0-60

IMPORTANT DATES

Classes begin	Tuesday, January 16
Add/Drop deadline	Wednesday, Jan. 31
Spring Break, no classes	March 11 - 15
Course withdrawal deadline	Friday, April 12
Last day of classes	Friday, May 3
NR 319 Exam 3 (Final)	(On Canvas) Open May 8 th – 9 th . Complete on your own.

EXPECTATIONS

Expectations from You:

- **Show up, put in the effort, and be engaged.** Active learning can be hard work! When attending lecture or watching the recordings, pay attention, take notes! Start each week having read the relevant readings, or reviewed the slides, ready to discuss the content, or ask questions to facilitate better understanding.
- **Complete all assignments**, and on time.
- Adhere to the **academic code of conduct**.
- **Communicate.** Contact the instructor or TA if you are having trouble.
- Be **respectful** of others. We can all learn from one another's stories, backgrounds, and ideas.
- **Ask for help, and help each other** when appropriate, within the limits of the code of conduct.

When emailing the instructor or TA, please include the course number in the subject line and your full name, CSU ID, and the course number in the email body.

Expectations of Me:

My goal is to teach you the **fundamentals of geospatial science** and provide ample opportunity to become proficient with geospatial software and solving simple spatial problems.

- I will teach using up-to-date materials and offer **relevant examples** from the geospatial industry.
- I will strive to help you understand the concepts and am happy to provide extra help when necessary, but sometimes the best learning is done through some struggle – so you'll have to "figure it out" sometimes too!
- Exams and assignments will be **graded** within about a week of the due date. I will typically respond to emails by the next day.

POLICIES

Attendance Policy: Listed in the Course Components section, above.

Participation and Engagement: All students need to attend or watch the lectures each week and promptly complete the quiz or any lecture activities, and complete the lab exercises the week it is assigned. All lectures and at least one lab demo per week will be recorded and posted to Canvas in Echo360.

- **Participation & Engagement:** In addition to attendance, this grade component includes a measure of participation and engagement. Examples are described above in the grading section.
- **Health-related and excused absences:** contact the instructor.

Late assignments / Make-up work:

- Please arrange any extended absences or makeup exams with the instructor ahead of time.
- **Lab quizzes & reports:** Due by the start of your next lab session. 20% late penalty if submitted by the end of the day after that next lab session, and not accepted after that.*
- **Lecture Quizzes** are officially *due* Sunday nights at midnight, with a no-penalty *grace period* until the next morning, Mondays at 8am. Quizzes will close at 8am Monday and are not accepted after that.*
- **Extra-curriculars** will be accepted at half-credit up to one week late.*

*Except with prior written permission from instructor/TAs. Please talk to us if you are struggling with the material, software or with personal, physical, or mental health issues.

For an extra point on the syllabus quiz – look up what this fun landmark is: 18.9108501, -155.67859280

SDC Accommodations: Any student who needs special accommodations or has special needs is encouraged to speak with me about those needs within the **first two weeks** of the semester. Extensions for assignments can be entered into Canvas for individual students entitled to them. Extended due dates should be worked out AHEAD OF TIME, not after the fact, and are not automatically applied.

Professionalism: Per university policy and classroom etiquette; cell phones and devices must be silenced during all classroom and lab lectures or you may be asked to leave. Please arrive on time for class. Students habitually disturbing class by talking/ arriving late etc., will be warned, and may suffer a grade reduction.

Academic Responsibility: All work in this course must be completed in accordance with the [CSU academic honesty policy](#). Plagiarism or failing to meet the academic honesty policy in other ways will result in a zero grade or dismissal from class, and will be reported. All work is to be done independently.

Open book exams and quizzes allow use of notes, class materials, and the internet, but you must still work alone. Students may discuss ideas and issues together in lab but you must complete your own work and cannot receive or give away answers. **By participating in this course, you agree to abide by the following honor pledge, “I will not give, receive, or use any unauthorized assistance in this course.”**

Need Other Help?

CSU is a community that cares for you. Counseling Services has trained professionals who can help. Contact 970-491-6053 or go to <http://health.colostate.edu>. “Tell Someone” by calling 970-491-1350 to discreetly discuss your concerns (<https://supportandsafety.colostate.edu/tell-someone/>).

Week	Dates	Lesson #	Lecture Topic & Quiz Info	Lab Exercise	Relevant Reading (Bolstad text)
1	Jan. 15		MLK Day, No Classes	Course Welcome + Lab 0 (pts): Computer skills & Geospatial Appetizers	Ch. 1
	Jan. 17	Lesson 0	Course Welcome What is Geospatial Syllabus QUIZ		
2	Jan. 22	Lesson 1	The past, present, and future of geospatial	Lab 1 Exploring Spatial Data and Software	Ch. 1
	Jan. 24	Lesson 2a	Understanding Spatial Data: Vector Weekly QUIZ 1		Ch. 2 (p.39-50)
3	Jan. 29	Lesson 2b	Understanding Spatial Data: Raster	Lab 1 Exploring Spatial Data and Software	Ch. 2 (p.51-65)
	Jan. 31	Lesson 3a	Aligning spatial data: projections Weekly QUIZ 2		Ch. 4 (p.147-153) + Ch. 3 (p. 87-107 & 116-135)
4	Feb. 5	Lesson 3b	Aligning spatial data: Coordinate systems	Lab 2 Maps, projections, and coordinate systems (oh my!)	Ch. 3 (p.87-107 & 116-135)
	Feb. 7		Review of geospatial basics Weekly QUIZ 3		
5	Feb. 12	Lesson 4a	Making maps	Lab 2 Maps, projections, and coordinate systems (oh my!)	Ch. 4 (p. 168-175)
	Feb. 14	Lesson 4b	Making maps Weekly QUIZ 4		Ch. 4 (p. 168-175) +375-382
6	Feb. 19	Lesson 5a	Where do spatial data come from?	Lab 3 Creating and collecting your own data	Ch. 4 (p.147-167) + Ch. 6, 7
	Feb. 21	Lesson 5b	Making your own spatial data EXAM 1		Ch. 4 (p. 147-167)
7	Feb. 26	Lesson 5c	Spatial Data Sources: Tables	Lab 3 Creating and collecting your own data	Ch. 8
	Feb. 28	Lesson 5d	Spatial Data Sources: the Internet! Weekly QUIZ 5		Ch. 7

Week	Dates	Lesson #	Lecture Topic & Quiz Info	Lab Exercise	Relevant Reading (Bolstad Text)
8	Mar. 4		Review of spatial data sources		
	Mar. 6	Lesson 6	Data preparation and geoprocessing Weekly QUIZ 6	Lab 4 (self-directed) Mtn. Campus data and map	Ch. 9
9	March 11 – 15 - SPRING BREAK - No classes				
10	Mar. 18	Lesson 7	Dealing with Distance: Proximity analysis		Ch. 9 (p.388-393)
	Mar. 20	Lesson 8a	Overlaying spatial data (Part 1) Weekly QUIZ 7	Lab 5 Suitability Analysis	Ch. 3 Ch. 9 (394-405)
11	Mar. 25	Lesson 8b	Overlaying spatial data (Part 2)		Ch. 9 (p. 394-405)
	Mar. 27	Lesson 9	Raster data processing Weekly QUIZ 8	Lab 5 Suitability Analysis	Ch. 2 (p. 51-60) + Ch. 10, 11
12	Apr. 1		Review of spatial analysis techniques		Ch. 9 (p. 406-409)
	Apr. 3	Lesson 10	Remote Sensing Basics EXAM 2	Lab 6 Land cover classification and change detection	
13	Apr. 8	Lesson 11	No lecture: Watch Data Quality/Integrity video		Ch. 14
	Apr. 10	Lesson 12	Summarizing spatial data Weekly QUIZ 9	Lab 6 Land cover classification and change detection	Ch. 10 (p. 459-460), Ch. 9 (p. 384-385)
14	Apr. 15	Lesson 13	Spatial Modeling and workflows		Ch. 13
	Apr. 17		Review Weekly QUIZ 10	Lab 7 Raster overlay + Final project planning	
15	Apr. 22	Lesson 14	GPS / Field data collection techniques		Ch. 5
	Apr. 24	Lesson 15	Web GIS Weekly QUIZ 11	Lab 8 Final project, self-directed	
16	Apr. 29	Lesson 16	Geospatial platforms and FOSS4G		Ch. 15
	May 1		Geospatial: What's Next + Final review	Lab 8 Final project, self-directed	
	May 8-9	EXAM 3 Open May 8, 6am – May 9, midnight. On Canvas.			

Quizzes are due Sundays at midnight after the material is covered. Refer to Canvas for the exact lab due dates/times.