UC SANTA BARBARA
Bren School of Environmental Science & Management

EDS 223: Geospatial Analysis & Remote Sensing

Quarter: Fall 2024
Units: 4
Grading: Letter
Prerequisites: EDS 221 or equivalent (ESM 232, ESM 244 or equivalent for non-MEDS students)

Course Basics

Instructor: Ruth Oliver
Email: rutholiver@bren.ucsb.edu
Office: Bren Hall 4512
Student hours: Thursday 4-5pm PT
The best way to contact me is: Slack

Teaching Assistant: Alessandra Vidal Meza
Email: avidalmeza@ucsb.edu
Student hours: TBD
The best way to contact me is: Slack

Class meets: Monday 12:30-3:15 PT (Bren 1424)
Discussion section meets: Thursday 1-1:50 or 2-2:50 PT (Bren 3526)
Course website: eds-223-geospatial.github.io

Computing requirements:

- Minimum MEDS device requirements
- R version 4.4.0 (or higher)
- RStudio version 2024.04.02 (or higher)
- GitHub account

Course Details

Course Website:

https://eds-223-geospatial.github.io/

All lecture slides, lab materials, resources, and important information will be posted to this course website. Be sure to bookmark it somewhere you can easily find it!

Course description: This course introduces the spatial modeling and analytic techniques of geographic information science to data science students. The emphasis is on deep understanding of spatial data models and the analytic operations they enable. Recognizing remotely sensed data as a key data type within environmental data science, this course will also introduce fundamental concepts and applications of remote sensing. In addition to this theoretical background, students will become familiar with libraries and packages that support spatial analysis in R.

Learning objectives: The goal of EDS 223 is to prepare students to solve environmental problems using spatial approaches and remote sensing data. To accomplish this goal, we will aim to achieve the following learning objectives:

Tentative Schedule

Please note that the following schedule is subject to change.

Tentative Course Schedule	
Week	**Topics**
1 (9/30)	**Course overview & intro to spatial data models** • Map making basics
2 (10/7)	**Intro to vector data** • Coordinate reference systems • Intro to 'sf' • Attribute data operations
3 (10/14)	**Vector operations** • Vector spatial operations • Vector geometry operations
4 (10/21)	**Intro to raster data** • Intro to 'terra' • Raster spatial operation
5 (10/28)	**Intro to remote sensing & electromagnetic radiation** • Active vs. passive RS • Energy transfer
6 (11/4)	**RS data collection** • Displaying multi-band data
7 (11/11)	• **No class this week**
8 (11/18)	**RS of vegetation** • Band math
9 (11/25)	**Multispectral RS analysis** • Landcover classification • **No discussion section this week**
10 (12/2)	**Active RS** • LiDAR & RADAR

How will I be evaluated?

This class will implement an alternative grading approach called **specifications (specs) grading.** The following materials were originally developed by Sam Csik for EDS 240.

What is specifications (specs) grading?

While different instructors / courses may implement their own variation of specs grading, generally it refers to:

> "*an alternative grading method where instructors create a list of specifications that describe the qualities and characteristics of a successful submission for an assignment. Student work is graded holistically based on those specifications, earning a single mark: "Satisfactory" or "Not Yet". Students have the chance to use feedback by revisiting and resubmitting for full credit*."
>
> - expert from "Grading for Growth: A Guide to Alternative Grading Practices That Promote Authentic Learning and Student Engagement in Higher Education", by David Clark & Robert Talbert

Why use an alternative grading approach ?

"Traditional" grading (assigning points to one-time assessments and aggregating those points into a letter grade for a course) comes with a variety of challenges:

- It **lacks feedback loops** -- there are (often) no reattempts or revisions of work based on feedback, making it difficult for students to demonstrate (and instructors to assess) learning or growth
- It **disproportionately benefits** students who learn fast, or who already have familiarity with the material
- Traditional grades are **bias-prone** (e.g. awarding participation points, granting deadline extensions)
- It can be **demotivating** and discourage students from learning for its own sake (motivation often comes from "chasing the A," rather than learning and growing)
- It can promote **unhealthy student-instructor relationships**

How does specs work for *this* course?

Specs grading for EDS 223 adapts the model used in for EDS 240, taught by Sam Csik and Processes in Ecology and Evolution (BIO SCI E106), taught by Dr. Celia Faiola & Dr. Celia Symons.

- Each assignment will be accompanied by a **clear rubric** (containing specifications) which outlines what must be completed (and how) in order to receive a "Satisfactory" mark. Not meeting all specifications will result in a "Not Yet" mark.
- Students can trade "tokens" for the **opportunity to revise and resubmit** assignments that have received a "Not Yet" mark. Tokens may also be traded in for assignment extensions, or missing class (which is otherwise mandatory to attend, unless for an excusable emergency).
- Students **earn tokens** (primarily) by attending discussion sections

Why tokens? And how do I earn and redeem them?

Everyone has different responsibilities and demands, both in and out of school. Tokens give you the power and freedom to ask for the accommodations you need for your schedule. *Specifications grading allows you to take ownership of your own learning and define your own priorities*.

You *do not* need to provide a reason for an extension or resubmission, however you must have enough tokens to request one. I will not assume that you plan to trade in tokens for extensions or assignment resubmissions -- you must let me know of your intention to use them by filling out the Google form below:

Redeem tokens by filling out this Google form:
https://forms.gle/yEbmtefdiT5TXCqF9

Note: *tokens are not limitless and they accrue weekly* (i.e. you don't receive them all at the start), so use them wisely! Only under extreme circumstances will we consider accommodating additional extensions or resubmissions if you run out of tokens.

The Grade Tracker, below, summarizes how you earn tokens.

- **Everyone begins with 0 tokens**.
- You will **earn your first token** by attending Discussion Section #1, and an **additional 3 tokens** upon completing and submitting Self-reflection (SR) #1.
- After that, you can **earn 1 token per week** by attending and participating in your discussion section. *You must attend the entire 50 minutes of discussion to earn your token*.

How are course grades determined?

A summary of the class assessments which will determine your overall course grade, are provided in the Grade Tracker, below. You will use this tracker to determine your course grade. Please see UCSB's grading system to learn how the registrar converts letter grades to grade points.

Homework assignments and their corresponding rubric (containing specifications for earning a "Satisfactory" mark) will be posted to the course website. Assignment materials will be posted, submitted, and graded via GitHub Classrooms (unless otherwise noted).

Assignments grades ("Satisfactory" or "Not Yet") will be posted to Canvas and updated accordingly as you choose to use tokens for extensions, resubmissions, etc.

Grade Tracker

*Your grade is the highest category for which you meet **all** criteria.*

Assessments

End-of-Class Surveys (EOCs)
Short surveys to help me better understand your class experience.
(total of 9 EOCs)

Self-reflections (SRs)
A place to reflect on your learning plan / goals, challenges, etc.
(total of 3 SRs)

Homework Assignments (HWs)
Longer assignments to apply conceptual knowledge and technical skills.
(total of 4 HWs)

Portfolio Repository(PR)
Practice presenting your work in a professional form.
(total of 1 PR)

Letter Grade

Receive a "Satisfactory" mark on the following:

A	B	C	D	F
4 HWs 3 SRs 1 PR	3 HWs 3 SRs 0 PR	2 HWs 2 SRs 0 PR	1 HWs 1 SRs 0 Pr	0 HWs 0 SRs 0 PR

Add a (+) to Letter Grade:	Letter Grade as-is:	Add a (-) to Letter Grade:
- Submit > 6 EOCs	- Submit 6 EOCs	- Submit < 6 EOCs

Earn Tokens by:

- Completing SR #1 **(3 tokens)**
- Attending discussion section **(1 token / week; must attend *full* session)**

Exchange Tokens for:

- 24hr extension on any HW *or* SR **(1 token)**
- 72hr extension on any HW *or* SR **(2 tokens)**
- Revise / resubmit a HW within one week of its return **(3 tokens)**

Grade Tracker inspired by the syllabus for BIO SCI E106 Lec A (Processes in Ecology and Evolution, Winter 2022), by Dr. Celia Faiola & Dr. Celia Symons and EDS 240 by Sam Csik.

Assignment Calendar				
Week Assigned	Assignment	Date Assigned	Date Due	Week Due
1	EOC #1	09/30/2024	09/30/2024	1
	SR # 1	09/30/2024	10/05/2024	
	HW #1	09/30/2024	10/05/2024	
2	EOC #2	10/07/2024	10/07/2024	2
	HW #2	10/07/2024	10/19/2024	3
3	EOC #3	10/14/2024	10/14/2024	
4	EOC #4	10/21/2024	10/21/2024	4
	HW #3	10/21/2024	11/09/2024	6
5	EOC #5	10/28/2024	10/28/2024	5
	SR #2	10/28/204	11/02/2024	
6	EOC #6	11/04/2024	11/04/2024	6
7	HW #4	11/11/2024	11/30/2024	9
	PR	11/11/2024	12/07/2024	10
8	EOC #7	11/18/2024	11/118/2024	8
9	EOC #8	11/25/2024	11/25/2024	9
10	EOC #9	12/02/2024	12/02/204	10
	SR #3	12/02/2024	12/07/2024	

Note: All assignments are **due at 11:59 PM** on the date listed. Homework Assignments and Reflections are always due on Saturdays to ensure that you have at least one day a week with no course obligations

Policy on Generative AI

(adapted from policy for EDS 220, developed by Dr. Galaz Garcia)

Generative AI tools are increasingly being used to assist in a wide variety of tasks, including developing code. While this can be beneficial, it should not serve as a substitute for understanding our code, including what we are trying to accomplish, why we select certain approaches, and how it works. In this course, using generative AI tools (such as ChatGPT) is strongly discouraged based on the following considerations:

- The core competencies we are hoping to build in this class require the ability to critically dissect programming challenges, which must be built through practice.
- ChatGPT is not a replacement for expert coding and in many cases requires advanced knowledge to debug its output. Even if your eventual goal is to rely heavily on generative AI tools, you will still need to build your own programming proficiency to engage within them productively. For example, ChatGPT is known to “hallucinate” false information.
- Many generative AI tools are likely to become subscription based and may not be accessible to all students.

As such, you should adhere to the following guidelines:

- Feel free to use spell check, grammar check, and synonym identification tools (e.g. Grammarly and Microsoft Word).
- Be prepared to explain each line of code in your assignments and exercises.
- If you use generative AI in completing assignments, include a copy of the prompts and outputs.

Uncritical uses of generative AI in assignments will receive lower scores. Not acknowledging use of generative AI in assignments will result in a zero for the assignment.

Access, accommodations and conduct

Course conduct: All students are expected to read and abide by the UCSB Code of Conduct. In this course, I will work to create an inclusive environment for all students. I recognizie that discrimination can be direct or indirect and operate at many different levels, which I might not be aware of. To ensure an equitable classroom, I am committed to eliminating any discrimination, harrassment, or bullying either in person or online. I encourage students to share and/or update their name and pronouns by reaching out to me directly. If you feel this course is not an inclusive environment, please reach out to me or the Program Coordinator Jamie Montgomery (jmontgomery@bren.ucsb.edu)

Access and Accommodations: Please submit requests for accommodations often and early. It is never too late to apply for DSP accommodations. If you have any kind of disability, whether apparent or non-apparent, learning, emotional, physical, or cognitive you may be eligible to use formal accessibility services on campus. To arrange class-related accommodations, please contact DSP. DSP will initiate communication about accommodations with faculty. By making a plan through DSP, appropriate accommodations can be implemented without disclosing your specific condition or diagnosis to course instructors.

COVID-19 precautions: While masks are not required, Santa Barbara County continues to recommend that masks be worn indoors. Free masks can be picked up at many locations around campus, including the UCEN Campus Store Customer Service Desk, the A.S. Pardall Center, and other locations around campus. Please respect one another's choices regarding whether or not to wear masks**.**

Additional student resources

The text below is provided by the UCSB Disabled Students Program.

Counseling and Psychological Services (CAPS). As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down,

difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce your ability to participate in daily activities. CAPS is available to assist you with addressing these and other concerns you may be experiencing. You can learn more about the broad range of confidential mental health services available on campus. They can be reached by phone at 805.893.4411, or online at http://caps.sa.ucsb.edu. The CAPS building is the pink building next to the Humanities and Social Science building (HSSB)

Food insecurity: http://food.ucsb.edu/ includes the Cal Fresh Program http://food.ucsb.edu/calfresh and the Associated Students food bank https://foodbank.as.ucsb.edu

Resource Center for Sexual and Gender Diversity (RCSGD) in the SRB, offers a host of services for LGBTQI+ students including a library and many events throughout the year. http://rcsgd.sa.ucsb.edu/

Dream Scholars/Undocumented Student Services Program offers workshops, helps students find scholarships and financial support as well as providing community for our undocumented students. http://www.sa.ucsb.edu/dreamscholars/home

Campus Learning Assistance Services (CLAS) helps students grow academically by offering workshops, walk-in and pre-scheduled tutoring, and writing help both for native and non-native (ESL) English as a second language speakers. Over 50% of students will stop by CLAS at one time or another. http://clas.sa.ucsb.edu

Student Resource Building (SRB) houses many campus resources offices, including the African Diasporic Cultural resource Center, the American Indian Resource Center, the Asian Resource Center, the Middle Eastern Resource Center, the Non-Traditional and Re-Entry Student Resource Center. http://www.sa.ucsb.edu/student-resource-building/home

Multicultural Center (MCC), located in UCEN, hosts a wide variety of cultural events and educational programming throughout the year, including film showings, lectures, musical performances, and more: http://mcc.sa.ucsb.edu/

Campus Advocacy, Resources, & Education (CARE) offers 24/7 confidential support and advocacy in situations of sexual assault, dating and domestic

violence, and stalking. Located in the SRB, they can be reached at 805.893.4613 or http://wgse.sa.ucsb.edu/care/home

Financial Crisis Response Team: If you are experiencing issues of housing insecurity contact the Financial Crisis Response Team at financialcrisis@sa.ucsb.edu to begin application for assistance.

Health and Wellness: Student well-being is integral to academic success, student development, and life satisfaction. On this website, students will find links to a range of services related to well-being such as: assistance with basic needs (food, housing, finances); counseling and physical health resources, daily wellness centers and programs; social connection, and personal safety. https://wellbeing.ucsb.edu/