UC SANTA BARBARA
Bren School of Environmental Science & Management

EDS 220: Working with Environmental Data

(4 units, Fall 2024)

Course Listing: https://bren.ucsb.edu/courses/eds-220

Course description

Class
Monday and Wednesday 9:30 - 10:45, Bren Hall, 1424.

Discussion Sections
Thursday 1:00 - 1:50, Bren Hall 3022.

Instructor
Carmen Galaz García (she/her/hers)
E-mail: galazgarcia@bren.ucsb.edu
Student hours: Wednesday 4-5 pm @ Bren Hall 4424
Best way to contact me: email

TA
Annie Adams (she/her/hers)
E-mail: aradams@ucsb.edu
Student hours: Thursday 12 pm - 1 pm @ Bren Hall 3022
Best way to contact me: email

Website
https://meds-eds-220.github.io/MEDS-eds-220-course/
Grades will be posted on UCSB's Canvas.
All assignments will be due on Gradescope.

Class description
This hands-on course explores widely used environmental data formats and Python libraries for analyzing diverse environmental data. Students will gain experience

working with popular open data repositories and cloud platforms to source and analyze real-world environmental datasets. The course will also serve as an introduction to Python programming and provide opportunities to practice effective communication of the strengths and weaknesses of students' data products and analyses.

Learning Objectives

By the end of this course students will be able to:

- Write Python code from scratch following best practices and adapt code others write.
- Manipulate various types of environmental data, including tabular, vector, and raster data, using established Python libraries.
- Find and access datasets from major public environmental databases.
- Produce effective reports that combine text and code to share their data analyses with colleagues.
- Independently design and carry out analyses of individual environmental datasets.

Code of conduct

We expect all course participants (including instructors, guests, and students) to be committed to actively creating, modeling, and maintaining an inclusive climate and supportive learning environment for all. We expect everyone to treat every member of our learning community with respect. Harassment of any kind will not be tolerated. Everyone is expected to read and adhere to the Bren School Code of Conduct and the UCSB Code of Conduct.

Required & Recommended Materials

There is no required textbook for this course. Some great public-access online books that can supplement the course materials are:

- An Introduction to Earth and Environmental Data Science
- Earth Observation Using Python: A Practical Programming Guide
- Use Data for Earth and Environmental Science in Open Source Python
- Python for Data Analysis

Access & 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 the Disabled Students Program (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.

Evaluation

Grading Distribution

- Homework: 75% (4 assignments, each 18.75%)
- Portfolio: 20%
- Participation: 5%

See the sections below for details about each of these assessments.

Grade cutoffs

A+ (≥ 97%), A (≥ 92%), A- (≥ 90%),
B+ (≥ 87%) , B (≥ 82%), B- (≥ 80%),
C+ (≥ 77%), C (≥ 72%), C-(≥ 70%),
D+ (≥ 67%), D (≥ 62%), D-(≥ 60%), (60>) F.
There is no Pass/No Pass grading option for this course.

Homework

There will be 4 homework assignments. Assignments are assigned every other Friday starting on week 1 and should be submitted by 11:59 pm on next week's Saturday. Working together and collaborating with peers on homework is highly encouraged! However, submissions are individual so make sure you understand everything you are turning in.

General homework regrading calendar.

M	T	W	R	F	S	Su
				Hwk posted		
					Hwk due	
		Hwk grades due		New hwk posted	Resubmission due	
		Resubmission grades due			Hwk due	

Homework due and resubmission dates.

Hwk	Date Posted	Due Date	Resubmission Date
1	Friday 10/4	Saturday 10/12	Saturday 10/19
2	Friday 10/18	Saturday 10/26	Saturday 11/2
3	Friday 11/1	Saturday 11/9	Saturday 11/16
4	Friday 11/15	Saturday 11/23	Saturday 11/30

All students can resubmit their assignments three days after they have received initial feedback. In this second submission, students may recover up to 50% of the points not obtained during the initial submission. Revisions, corrections, and improvements are crucial in the learning process! We greatly encourage you to resubmit your revised assignments.

Example:

> You submitted your homework on time on the due date and got a 6/10 in the assignment the coming Wednesday. You may build on the feedback received to correct your work and resubmit to improve your grade up to 8/10.

Please note, except for extenuating circumstances, **there will be no extension for any assignment.** Late submissions will be accepted at the resubmission date and can obtain up to 50% of the assignment points.

Portfolio

The final assignment for the course will be creating data science materials for the students' online professional portfolio. The portfolio materials consist of two items. The first one is a presentation-ready repository featuring geospatial analysis in Python. The second one is adding a blog post to their personal website based on previous assignments and discussion sections.

The 20% grade for the portfolio is divided as follows:

- 13% Data analysis + GitHub repository: a GitHub repository containing a finalized Jupyter Notebook and associated files for the data analysis,
- 7% blog post: the final project will be included as a blog post in the student's professional portfolio.

Both a submission and a revised submission addressing all the feedback from the first revision will be needed for these two tasks. The calendar for the portfolio submission is below.

Portfolio due and resubmission dates.

Project component	**Available on**	**Due date**	**Feedback available on**	**Final submission**
Data analysis + GitHub repository	Monday 11/25	Saturday 12/7	Tuesday 12/10	Friday 12/13
Blog post	Monday 11/25	Wednesday, 12/4	Tuesday 12/10	Friday 12/13

Students will need to create a Quarto personal website to submit the final project. All students enrolled in the course are invited to also enroll in EDS 296-1F (Data Science Tools for Building Professional Online Portfolios), which will, in part, guide students through creating such websites (non-MEDS students should see the Bren website for prerequisites). The necessary course materials are also available to follow online:

Creating personal websites using Quarto
Customizing Quarto Websites using CSS & Sass
Adding a blog to your existing Quarto website

Participation

To obtain full participation credit, students must:

1. Answer two short surveys about their course experiences, one at the beginning and one at the end of the course.
2. Share their coding solutions for exercises or homework during lecture or discussion sections at the front of the class at least once during the course. A

presentation date during the discussion section has been randomly assigned to each student: click to see presentation calendar. Students can trade dates among themselves if they're unable to attend the assigned date. Please notify the TA or instructor about any presentation updates. Time for presentation during class time may also be available (although unscheduled) and will count for the presentation grade.

Class calendar

The following is a simplified calendar for the course to indicate due dates and weekly topics. *The lecture plan and calendar may be subject to change as the course progresses.*

Week (Monday start date)	Topic	Monday - Lecture	Wednesday - Lecture	Thursday - Discussion Section	Friday	Saturday
Week 0 **Sept 23**	-			**Sept 26** Course starts	**Sept 27** Entry survey due	-
Week 1 **Sept 30**	Python Review / Tabular Data I				**Oct 4** Hwk 1 available	-
Week 2 **Oct 7**	Tabular Data II				-	**Oct 12** Hwk 1 due
Week 3 **Oct 14**	Tabular Data III				**Oct 18** Hwk 2 available	**Oct 19** Hwk 1 resubmission
Week 4 **Oct 21**	Vector Data I				-	**Oct 26** Assignment 2 due
Week 5 **Oct 28**	Vector Data II				**Nov 1** Hwk 3 available	**Nov 2** Hwk 2 resubmission
Week 6 **Nov 4**	Multi-dimensional data				-	**Nov 9** Assignment 3 due
Week 7 **Nov 11**	Rasters I	**Oct 11** No class / Veteran's day			**Nov 15** Hwk 4 available	**Nov 16** Hwk 3 resubmission
Week 8 **Nov 18**	Rasters II				-	**Nov 23** Assignment 4 due
Week 9 **Nov 25**	Rasters II	**Nov 25** Portfolio instructions available		**Nov 28** No section / Thanksgiving Break	**Nov 29**	**Nov 30** Hwk 4 resubmission
Week 10 **Dec 2**	Extra topics		**Dec 4** Blog post due			**Dec 7** Data analysis + GH repo due
Finals **Dec 9**	-				**Dec 13** Portoflio final submission	**Dec 14** Exit survey due

Policy on Generative AI

We recognize that writing code can be difficult. Generative AI (GenAI) tools have made tremendous advances in helping us improve our coding skills. However, they should never substitute a thorough understanding of what we are programming and why. **In this course, using generative AI tools (such as ChatGPT) is discouraged.** There are several reasons for this:

- A core goal of this course is for you to become proficient in the fundamentals of Python coding. We are confident you can achieve this by *practicing*. Practicing involves making mistakes and taking time to find solutions to gain *understanding*.
- Human collaboration is greatly encouraged for all the assignments and projects in this class. At this point in your program, you will gain a lot from

collaborating with your peers, TA, and instructor, probably more than from interacting with a chatbot. In particular, your TA and instructor are ready to help you with any questions or roadblocks!
- GenAI tends to "hallucinate," making up incomplete, incorrect, nonexistent, biased, or otherwise problematic information. You will be a more responsible and efficient GenAI user later on by first cultivating an adequate and independent understanding of coding and widely used libraries.
- The existence and use of subscription versions of AI tools may not be accessible to all students, and differences between subscription and free versions are not understood. Subscription services that aid to gain better grades may induce an inequitable learning environment.

With all this in mind, you will need to **adhere to the following guidelines in our class:**

- You can freely use spell check, grammar check, and synonym identification tools (e.g., Grammarly and MS Word).
- If you use GenAI for code assistance, your default should be to assume the answers you get are wrong. You must ensure you understand and can explain each line of code the platform generates.

Assignments that make a low-energy or unreflective use of GenAI will be heavily penalized.

We acknowledge that different instructors may prefer different uses of AI tools during their classes. This policy depends, on the student side, on goodwill and a desire to gain understanding of the topics covered in the class, and on the instructor side, on a continuous commitment to supporting student learning. Let's work together to make the most out of this course!

Student Resources

There are many on-campus resources for helping students navigate different challenges and grow community. I am available to discuss your individual needs and help guide you towards a campus resource that may be best suited to your situation. A number of those resources are listed, below:

Basic Needs Resources & Food Insecurity
UCSB has a dedicated team for helping students navigate and find help meeting basic needs. Explore the Basic Needs Resources web page for more information on

their many resources, including information on the CalFresh Program and The Associated Students food bank.

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)

Resource Center for Sexual and Gender Diversity (RCSGD)
Located in the Student Resource Building (SRB), RCSGD offers a host of services for LGBTQ+ students, including a library andmany events throughout the year. Learn more at: https: //rcsgd.sa.ucsb.edu/

Undocumented Student Services (USS) Program
The USS Program and associated Dream Scholars Resource Team (DSRT) offer workshops, help students find scholarships and financial support, and work to provide a community for undocumented students. Learn more at: https://uss.sa.ucsb.edu/

Campus Learning Assistance Services (CLAS)
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)
The 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)

The 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)
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/