UC SANTA BARBARA
Bren School of Environmental Science & Management

EDS 221: Scientific Programming Essentials (4 units)

Course Catalog: ***https://bren.ucsb.edu/courses/eds-221***

Prerequisites: None required for MEDS.

Meeting Time & Location

Course Dates: Monday (2025-08-11) - Friday (2025-08-22)
Location: NCEAS 1st floor classroom (see the MEDS website for directions on how to find us!)

EDS 221 is an intensive 2-week long 4-unit course. **Students should plan to attend *all* scheduled sessions.** All course requirements will be completed between 10am and 4:30pm PT (M - F), i.e. you are not expected to do additional work for EDS 221 outside of those hours, unless you are with the Teaching Assistant in student hours.

Instructor & TA Information

	Ruth Oliver (Instructor)	Alessandra Vidal Meza (TA)
Email	rutholiver@ucsb.edu	
***The best way to**	MEDS Slack **#eds-221-sci-computing**	MEDS Slack **#eds-221-sci-computing** channel

contact me is	channel	
Learn more about me	oliverlab.org	Ale's Bren profile

***If you have a question about course-related content, we ask that you reach out about it in #eds-221-sci-computing channel, rather than a direct message or email** -- oftentimes there are others who have the same question and will benefit from seeing the discussion! Of course, please direct message or email with any personal questions or concerns.

Course Details

Course Website:

https://eds-221-programming-essentials.github.io/

All course content / information will be posted to this course website. Be sure to bookmark it somewhere you can easily find it!

Course Description & Learning Objectives:

This course teaches key scientific programming skills and demonstrates the application of these techniques to environmental data analysis and problem solving. Topics include structured programming and algorithm development, flow control, simple and advanced data input-output and representation, functions and objects, documentation, testing and debugging. The course will be taught using a combination of the R and Python programming languages.

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By the end of EDS 221, students should be able to:

- Understand, create, and work with different data structures (e.g. vectors, data frames, lists) and types (e.g. numeric, character, factor, logical, date-times)
- Design, implement, test, and document functions, including functions with iteration, conditionals, messages, and warnings in R
- Use basic (non-collaborative) project-oriented workflows with reproducible code (R scripts, Quarto documents, Jupyter notebooks) and version control (git/GitHub basics)
- Perform basic data wrangling and visualization with real world environmental data and tidyverse packages (in R)
- Employ troubleshooting and debugging strategies including tools, mindsets, strategies, and resources

Computing requirements:

Reminder: *You can reference the MEDS installation guide if you need to (re)install / (re)configure any software.*

- Minimum MEDS device requirements
- R version 4.4.0 (or higher)
- RStudio version 2024.04.2 (or higher)
- git (configured on your local computer) & GitHub account (connected to your local git)

Recommended materials / resources:

There are no required textbooks or readers for this course.

Class structure:

Daily class structure may vary a bit day-to-day, however, you can *generally* expect two lectures, two interactive sessions, and an end-of-day activity to practice / reinforce concepts learned. There is no take-home homework.

Grades:

Grades for EDS 221 are assigned as either Satisfactory / Unsatisfactory (and are not included in the computation of your GPA). You must still earn a satisfactory grade to fulfill the requirements of your MEDS degree. Attendance each day is required to earn a Satisfactory grade. Please see the MEDS summer absence policy, below, for more details:

For summer Environmental Data Science (EDS) courses, graduate students are expected to be present in person for every day of class. The intensive nature of the summer session means that missing even a day or two can significantly hinder your progress in the program -- each day is equivalent to a week of instruction during which you will be learning crucial fundamentals. There is no online option to attend class remotely. Students should only miss a class if they are experiencing an illness or family emergency. If a student will miss part or all of a class, they must inform the instructor as soon as possible and devise a strategy to complete the coursework or risk not receiving a grade (including a "pass") for the course. If you are feeling ill, please do not come to class and contact the instructor to arrange accommodations.

Student Resources

There are *many* on-campus resources for helping students navigate different challenges and/or grow community. I am always 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.

- **NOTE: Booking an appointment with a CalFresh representative or Basic Needs Advising counselor is highly recommended!**
    - You can schedule a CalFresh Appointment for help starting an application or receiving guidance on applying for CalFresh
    - Schedule a Basic Needs Advising Session to help identify which basic needs resources might be the best fit for your needs / information on how to access those resources
    - See the Basic Needs Resources page for other appointment options

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 and many 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 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/