ESM 203 – Earth System Science
Fall, 2023

Meeting Location: Bren Hall, Room 1414 (8:00 am to 9:15 am)

Instructors

Kelly Caylor caylor@ucsb.edu
Scott Jasechko, jasechko@ucsb.edu

Instructor Office Hours

Caylor: https://calendly.com/caylor/office-hours
Jasechko: 1 hour on both Tuesdays and Thursdays: see class schedule
(S. Jasechko's office is Bren Hall 4404)

Teaching Assistants

Zoe Sims, zsims@ucsb.edu (Office: Bren Hall 3001)
Office Hours: Tuesdays 2:00 - 3:00 pm, or by appointment
Trace Martin, trace_martin@ucsb.edu (Office: 2027)
Office Hours: Thursdays 3:00 - 5:00 pm, or by appointment

Course objectives

- To provide a foundation in the tools and terminology of system science, their application to Earth's systems, their utility in environmental problem solving, and their relevance to successful environmental management.
- To be able to apply principles of mass, energy, and momentum balance to understand the dynamics of the Earth's biosphere, atmosphere, and hydrosphere.
- To be able to explain the critical observations and methods that provide the basis for our empirical understanding of global change and Earth system dynamics.
- To have a working capacity and familiarity with basics of environmental physics, including important principles of radiative transfer, fluid dynamics, and heat flow.
- To understand the drivers of local and regional atmospheric dynamics.
- To be able to describe the flow of mass and heat within the ocean and their importance to global and regional climates.
- To be able to describe the energy, carbon, and water balance of landscapes, and their dependence on land surface properties.

Course expectations

Together, we will define a set of expectations as students and instructors. Our goal as instructors in this class is to provide each of you with the experiences and information necessary to gain the requisite understanding, experience, and confidence necessary to allow you to analyze realistic environmental management problems through the perspective of system science. Our hope is that you will repeatedly fall back on Earth System Science content knowledge and *especially* an Earth System Science "way of thinking" as you confront and manage complex environmental issues throughout your professional lives.

Course Content Areas

- Earth System Science Principles
- Planetary and Surface Energy Balance
- Hydrological Processes and Water Management
- Atmospheric and Oceanic Circulation
- Carbon Cycle and Human Energy Use
- Climate Dynamics, Climate Models, and Climate Change

An up-to-date detailed schedule of topics and assignments (subject to changes) is here.

The Bren School Fall 2023 schedule is available here

Skill Areas

- Application of physical and chemical principles to understanding global, regional, or local-scale physical processes, including the influence of human activity.
- Understanding the degrees to which predictive capability exists and evolves.
- Practice in analyzing the system science principles underlying environmental management problems, such as climate change, water supply, mining, and soil erosion.
- A capacity to use models and interpret their results - as well as their accompanying uncertainty - to analyze environmental problems quantitatively.
- The ability to write brief, cogent assessments of a *state-of-knowledge* related to Earth System Sciences.

Course Assessment

Your performance in this course will be evaluated based on your participation in/completion of discussion section activities as well as four assignments, a midterm, and a final exam.

Component	**% of total course grade**
Discussion (participation and activities)	25%
Assignments	30% (3 Assignments at 10% each)
Midterm quiz	20%
Final	25%

Grading scheme

A+	97% to 100%
A	93% to 96.99%
A-	89% to 92.99%
B+	86% to 88.99%
B	82% to 85.99%
B-	79% to 81.99%
C+	76% to 78.99%
C	72% to 75.99%
C-	69% to 71.99%
D+	66% to 68.99%
D	62% to 65.99%
D-	50% to 61.99%
F	0% to 49.99%

Note on late assignments: This is a professional degree program, and we expect you to meet your deadlines. Of course, we also understand that we are in exceptional circumstances, and things come up - if you anticipate having trouble meeting deadlines, please let us know as soon as you can, and we'll do our best to accommodate all reasonable requests.

Assignments are expected to be completed prior to the assigned due date for full credit. Late assignments will be marked down 20% each day (i.e. 2-day late work graded at 90% (9 out of 10) will receive a grade of 50% (5 out of 10))

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/