

# Earth's Climate System

## Syllabus, Fall 2023 Sustainability Management PS5230

### Course Information

Time: Tuesdays, 4:10pm-6:00pm (*see schedule on last page*)  
Location: TBD

Instructor: Benjamin I Cook,  
TA: Anna Bugankova

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[adb2211@columbia.edu](mailto:adb2211@columbia.edu)

Textbook: *Climate Change, The Science of Global Warming and Our Energy Future*,  
second edition  
Mathez and Smerdon  
<https://cup.columbia.edu/book/climate-change/9780231547871>

### Zoom Link

<https://columbiauniversity.zoom.us/j/99489922499?pwd=WEZhQUo2RC93ajRqNlRPekFBQytSQT09>

Meeting ID: 994 8992 2499  
Passcode: SPS2023

### Description

This class provides a broad, quantitative introduction to the science underlying our understanding of the Earth's climate system. Students will first learn the basic, fundamental concepts of energy transfer, the greenhouse effect, and general circulation in the climate system. We will then build on these ideas to explore more specialized topics, including climate variability now and in the past, the signs of climate change, climate models, extreme events, and projections of future climate. Lectures and slides will draw from the scientific literature, as well as the latest IPCC Assessment Report (AR6). By the end, students will have a working knowledge of the climate system, giving them the knowledge and skills to evaluate statements and claims in the media and from their peers. Limited math (basic algebra) will be necessary for some of the assignments. All lectures will be recorded, and all slide decks will be uploaded to *Courseworks* after class.

### Assignments and Grade Breakdown

- 30%: 3 problem sets (alone or small groups, 30%)
- 35%: Group (3-4 people, assigned by the instructor) project on climate topic/solution
- 35%: Final exam (Take home, OPEN book)

### COVID Classroom Rules

- IF YOU FEEL SICK DO NOT COME TO CLASS. All lectures slides will be uploaded to Courseworks, and ALL LECTURES will be recorded (video and audio) and shared. We are prepared to provide whatever help you need outside of class to make sure you do not fall behind.

**School Policies and Expectations:**

Accessibility Statement – I want you to succeed in this course. Contact [disability@columbia.edu](mailto:disability@columbia.edu) for learning accommodations.

Names/Pronouns – You deserve to be addressed in a manner that reflects your identity. You are welcome to tell me your pronoun(s) and/or name (if different from University records) at any time, either in person or via email.

Discrimination – We embrace the diversity of gender, gender identity & expression, sex, sexual orientation, race, ethnicity, national origin, age, religion, disability status, family status, socioeconomic background, and other visible and non-visible identities. Columbia University does not tolerate unlawful discrimination, discriminatory harassment, sexual assault, domestic violence, dating violence, stalking, or sexual exploitation and all such conduct is forbidden by Columbia University Policy.

Duty to Report – You deserve a University community free from discrimination, harassment, and gender-based misconduct including sexual harassment, sexual assault, domestic and dating violence, stalking, and sexual exploitation. It is therefore University policy to require Columbia faculty and staff to report to EOAA any instance or allegation of prohibited conduct involving any undergraduate or any graduate student that is disclosed to, observed by, or otherwise known to that employee. This requirement to report is in place to help ensure that students are provided appropriate resources and to allow the University to mitigate harm to our community.

Confidential Resources - There are confidential resources on campus who do not have a Duty to Report, including:

- Sexual Violence Response & Rape Crisis/Anti-Violence Support Center (SVR)
- Ombuds Office
- Medical Services
- University Counseling and Psychological Services
- University Pastoral Counseling
- Columbia Office of Disability Services

University employees working in a confidential capacity will not report information shared with them.

Inclusion - In the M.S. in Sustainability Management program, faculty and staff are committed to the creation and maintenance of “inclusive learning” spaces – classrooms and other places of learning where you will be treated with respect and dignity, and where all individuals are provided equitable opportunity to participate, contribute, and succeed. In our Sustainability Management PS5230 classroom, all students are welcome regardless of race/ethnicity, gender identities, gender expressions, sexual orientation, socio-economic status, age, disabilities, religion, regional background, Veteran status, citizenship status, nationality and other diverse identities that we each bring to class.

Date	Lecture	Readings	Assignments
September 5	Introduction to the Climate System	M&S Prologue	
September 12	Global Energy Balance I	M&S Chapter 5	<b>PS #1</b>
September 19	Global Energy Balance II		
September 26	General Circulation I	M&S Chapter 1	
October 3	General Circulation II		<b>PS #1 Due; PS #2</b>
October 10	Ocean Circulation and El Niño	M&S Chapters 2, 3	
October 17	The Carbon Cycle	M&S Chapter 4	
October 24	Climate Forcings and Feedbacks	M&S Chapter 6	<b>PS #2 Due; PS #3</b>
October 31	Paleoclimate	M&S Chapters 7, 8	
<b>November 7</b>	<b>University Holiday-NO CLASS</b>		
November 14	Observations in a Warming World	M&S Chapter 9	<b>PS #3 Due</b>
November 21	Detection & Attribution	M&S Chapter 11	
November 28	Climate in the 21st Century	M&S Chapters 12,13	
December 5	Group Project Presentations		
<b>December 15</b>	<b>DUE DATE: PROJECT PAPER &amp; FINAL EXAM</b>		