OCEA90 Summer 2023

Fundamentals of Climate
Instructor: Murat Kucukosmanoglu (he/him), PhD. email: mkucukos@ucsc.edu
Office Hours: Tu 3.30-4.30 pm, F 4.00-5.00 pm
Class meetings: MW 06:00-09:30 PM, Cowell Clrm 131

LEARNING STATEMENT

Your success in this class is important to me. We all learn differently. If there are aspects of this course that prevent you from learning or exclude you, please let me know as soon as possible. Together we can develop strategies to meet both your needs and the requirements of the course.

Accommodations: UC Santa Cruz is committed to creating an academic environment that supports its diverse student body. If you are a student with a disability who requires accommodations to achieve equal access in this course, you have the right to have these met. Please submit your Accommodation Authorization Letter from the Disability Resource Center (DRC) to me by email, preferably within the first two weeks of the quarter. I would also like us to discuss ways we can ensure your full participation in the course. I encourage all students who may benefit from learning more about DRC services to contact DRC by phone at 831-459-2089 or by email at drc@ucsc.edu.

THE COURSE

Description: The climate of the Earth is undeniably changing. Through lectures, activities, and readings, we will explore the very nature of the Earth's climate, and how human activities are affecting it. The course introduces fundamental concepts such as the Earth's energy budget, the greenhouse effect, the circulation of the atmosphere and ocean, the El-Niño Southern Oscillation and other low frequency modes of natural climate variations, and climate change detection and attribution. The analysis of climate change is inherently statistical. Therefore, in addition to learning about how the climate system works, students learn about the statistical methods that underpin much of what is known about climate change. This class satisfies the Statistical Reasoning (SR) General Education requirement.
The general goals of this course are to:
1. Develop a basic understanding of climate
2. Learn to distinguish natural variations from anthropogenic changes
3. Apply statistical concepts and methods such as correlation and linear regression to analyze climate observations
This course was originally developed by Andrew Moore, and further modified by Claudie Beaulieu.

SCHEDULE

Module 1: Climate observations; an introduction to "R".
Module 2: Random numbers; probability density functions; cumulative distribution function; the Normal distribution.
Module 3: Earth energy balance; distribution of atmospheric pressure.
Module 4: General circulation of the atmosphere; Pressure gradient force; Coriolis force; geostrophic balance; the PNA pattern.
Module 5: The ocean circulation; gyres; Ekman transport; thermohaline circulation.
Module 6: El Niño Southern Oscillation. El Niño and La Niña impacts.
Module 7: Correlation**;** El Niño Southern Oscillation indices.

Module 8: Linear regression; detecting climate change in observations.
Module 9: Climate forcings; climate models.
Module 10: Attribution of climate change.

Communication: We welcome questions/concerns/comments in five ways:
During the class meetings.
During virtual office hours on Zoom.
Canvas message. If you want to talk to us about something private or ask a question in private, you can send us a message on Canvas. On the left side, click "Inbox," then on top, click "Compose a new message."

Please do NOT post solutions and answers to assignments (in whole or in part) on Discussion/Discord, ever, for any reason. It is, however, acceptable and encouraged to discuss homework ideas in general terms. If you do post solutions, this can be considered a violation of the UCSC academic integrity policy and may lead to consequences as outlined by that policy: https://registrar.ucsc.edu/navigator/section1/academicintegrity.

Withdrawal: July 3. Key dates for registration and enrollment can be found here: https://summer.ucsc.edu/studentlife/index.html

COURSE MATERIAL

Book: Introduction to Climate Science by Andreas Schmitter. This is a free open book available through this link. If you have a slow connection, I encourage you to download the PDF on your computer.

Software: Assignments are based on the open-source statistical software package R, which is a free software environment for statistical computing and graphics. You can download it here: http://www.r-project.org/. R is also available on all Mac and Win/PC Labs on campus if you don't have a laptop/desktop. For instructions on installing/accessing R see the Install R page on the Week 1 module in Canvas.

R is a wonderful tool, as it is free, open-source code. It runs everywhere, on UNIX platforms, Windows and Macs. It also provides an engaged community. It is actively maintained, it has good connectivity to various types of data and other systems, and it's versatile enough to solve problems in many domains.

All additional materials needed for this course are presented online through the course Canvas website.

ASSESSMENTS & GRADING

Assignments	50%
Activities	20%
Final exam	30%

Activities: There will be weekly activities/discussions that altogether will count towards 20% of the final grade. These activities are your opportunity to apply the concepts covered in lectures/readings at low stakes and prepare you for the assessments.

Assignments: There are 3 assignments that altogether will count towards 50% of the final grade. These assignments should be submitted via Canvas (see schedule below).

Exams: There will be one final exam during the quarter. A final exam (covering the whole quarter) scheduled during finals week on **07/28/2023**. The final exams will be open book, as in you are allowed to consult the course material while doing the exam. A study guide will be posted beforehand to highlight what is important to prepare.

An optional preparation exam has been scheduled for **July 17-19, 2023**, and it will provide an opportunity for extra credit that can positively impact your final score.

Schedule of assignments:

	Due (11.59 pm)
Assignment #1	July 10th
Assignment #2	July 17th
Assignment #3	July 24th

Schedule of activities/discussions/exams:

	Due (11.59 pm)
All activities	July 27th

Grading scale:
As: 100-90%
Bs: 90-75%
Cs: 75-60%
Ds: 60-50%
F: <50%
To satisfy general education requirements, the passing grade is a C (at least 65). Also, if you take the class P/NP, you need at least 65 to pass. You are not competing for grades with other students. It is possible for everyone taking this class to get an A. If the above scale results in too few As, Bs, and Cs, then a curve will be used to assign at least 10% As, 20% Bs, and 30% Cs.
Instructor feedback: We will provide direct comments and feedback on your assignments. Please click here to learn how to access comments in Canvas. For discussions, I will include a grading rubric that will be available to you prior to submitting your work. Please click here to learn how to access grading rubrics for assignments.

Late Work: Because we are in distressing and uncertain times, late work penalties are not applied to activities. For the assignments, 10% will be deducted for each day after the deadline. If you miss an assignment deadline due to illness or other extenuating circumstances, you need to get in touch with us to ask for an extension.

Make-up exams policy: Make-up exams will be granted only with a compelling reason and instructor approval. You will need to contact the instructor before the exam and seek approval for a make-up exam. Special circumstances will be considered on a case-by-case basis.

Academic integrity: You must turn in your own assignments using your own words and your own figures. Copying someone else's words/figures is not allowed and can lead to serious consequences. Please see the following for a description of the UCSC Academic Integrity policy:

https://registrar.ucsc.edu/navigator/section1/academicintegrity. We trust you to be honest and turn in your own work that reflects your own understanding.

Tips for success:

1- Plan ahead: plan your to-do list every week such that you can get help where needed early on;
2- Plan wise: watch lectures and do the readings before sections will ensure you are ready to work through activities during sections - that's the best use of your time;
3- Invest the time: UCSC's rule is to work ~15 hours per week outside lectures for a 5 credits course;
3- Work together: we guarantee you that you will achieve deeper learning by interacting with your peers on discussion sections;
4- Provide feedback: we will ask you for feedback regularly. If some concepts were less well understood, we will make adjustments during class meetings/discussions to revisit these concepts;
5- Ask questions: we encourage you to ask questions as soon as you get confused. Because each week's material is built on the previous ones, it is important not to drag concepts less well understood;
6- Communicate: if you are experiencing unusual/difficult circumstances, please let us know so that we can best support you;
7- Remember that even if you may struggle at times, it is normal, and you belong in this class!

RESOURCES

Slug Support: https://deanofstudents.ucsc.edu/slug-support/program/
If you are facing financial challenges, food and housing insecurity, or other concerns, and you are not sure how to find the resources you need.
Basic Needs: https://basicneeds.ucsc.edu
If you are experiencing challenges related to basic needs, such as food, housing, health & wellness, or financial security, visit the Basic Needs hub for information about food pantries, accessible housing, mental health support, and financial aid options
Student Success: https://studentsuccess.ucsc.edu/resource-centers/index.html
UC Santa Cruz has a variety of resources to support your overall success at UC Santa Cruz, ensure accessible living and learning environments, help you when you're experiencing personal or academic challenges, and support you in building community.
CAPS (Counseling and Psychological Services): https://caps.ucsc.edu/
If you are in distress, managing heightened stress and anxiety, or want to get more support and a counselor's perspective on something you're going through, CAPS provides a variety of services for your needs—including immediate crisis support, scheduled individual appointments, group counseling, and workshops led by peer advisors.
CARE (Campus Advocacy Resources and Education): https://care.ucsc.edu/CARE
Confidential space to discuss issues of dating violence, sexual assault, and stalking. CARE advocates provide support in a variety of ways depending on your needs, such as by supporting you in your decision-making; understanding the complexities that can arise from these issues; providing emotional support and free services; and providing resources and referrals.
Title IX: https://titleix.ucsc.edu/
UC Santa Cruz is committed to providing a safe learning environment that is free of all forms of gender discrimination and sexual harassment, which are explicitly prohibited under Title IX. You can report gender discrimination and sexual harassment and violence directly to the University's Title IX Office. Please be aware that if you tell me about a situation involving Title IX misconduct, I am required to share this information with the Title IX Coordinator. Although I have to make that notification, you will control how your case will be handled, including whether or not you wish to pursue a formal complaint.

- Reports to law enforcement can be made to the UC Police Department, (831) 459-2231 ext. 1.
- For emergencies, call 911.