

GEOL 150
Climate Change
4 Units
Fall 2019, Lecture M,W,F 10:00-10:50am
Salvatori Computer Science Center (SAL), 101

Instructor: Professor, Lowell D. Stott, Department of Earth Sciences

Office Hours: MWF: 11-12

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Teaching Assistants: TBD

Lecture: Monday, Wednesday, And Friday, 10:00-10:50 a.m. Office: ZHS 235

Laboratory Sections: TBD

Required e-Textbook: **Our Changing Climate: Introduction to Climate Science**

ISBN-**9781935704829**

Course Description: Climate variability and change is potentially one of the most serious challenges the world has ever faced. This class will survey the scientific basis of global warming and future climate change and the possible impacts that will accompany that change. We will examine the factors that influence climate system behavior on our planet. To provide perspective on the climate changes taking place today we will also examine how the Earth's climate has varied in the past, prior to the short period that humans have inhabited the planet. We'll see that the Earth has experienced significantly different climate conditions in the past. There are important lessons to be learned from Earth's past.

Learning Outcomes: Students will gain an understanding of the major processes that affect the Earth's climate system including the energy balance that maintains the atmosphere's temperature and distinguishes our planet from every other planet in the solar system. Students will learn how the sources of greenhouse gas concentrations vary over time, contributing to climate change and the impact of climate change on the droughts, flooding, health, and the economy. Students will also learn how climate science is carried out and how new scientific knowledge can aid in policy decision making.

e-Book: This semester we will use, **Our Changing Climate: Introduction to Climate Science**. The author is Chad Kauffman. The book is published by the American Meteorological Society as an e-book. You can purchase your rental at the following link:

<https://edubooks.ametsoc.org/CLTX-Ed1>. This format has many advantages over the traditional printed texts.

A special note about the e-book. At the beginning of each chapter there are a series of questions that provide you a guide to the main points you should learn from the chapter. Please be sure to read these questions before you embark on the chapter so that you know what the main points are for that chapter.

At the end of each chapter are a series of questions. If you can answer the questions correctly, you have successfully learned what you need to from this chapter.

In Class Questions: You'll be asked questions during lecture that you will answer using your smart device . These will provide feedback to me so that I understand how well you are understanding the material we are discussing.

Homework: You are required to answer the **Progress Questions** at the end of each chapter. These multiple-choice questions will be due at 11:59pm on Sunday the night before the next chapter starts with Monday's lecture.

To access the **Progress Questions**, login to: <https://edubooks.ametsoc.org/CLTX-Ed1>

login username: **your username**

password: **your password**

Go to "RealTime Portal

Click on Chapter Progress

Click on Chapter Progress Questions for a Chapter

Midterm Exams. Two midterm exams will be conducted. Each is 50 questions, multiple choice. The questions are taken from Lecture and Reading assignments.

Laboratory: You are required to do a laboratory section, which will be taught by a TA. These labs provide hands on experience that we have designed so that you get a sense of how climate science is conducted and how scientists formulate hypotheses and then test these hypotheses against observations and experiments.

Grading: Details about grading are summarized at the end of the syllabus. Scores on all assignments and exams will be posted on Blackboard.usc.edu

Academic Integrity: University policies on academic dishonesty are printed in SCAMPUS and SJACS, s. Because cheating negatively affects everyone in the class, we will follow USC guidelines and report all academic misconduct. USC policies on cheating are strict and the minimum punishment is a "0" on the assignment. The instructor and TA's are always available for extra help and advice. If the Prof. thinks you are at risk of failing the course, he will let you know via email and will encourage you to get extra help.

Disability Services: Students requesting academic accommodations based on a disability are required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP when adequate documentation is filed; *please be sure the letter is delivered to the professor as early in the*

semester as possible, and at least 2 weeks prior to the first midterm. DSP is open Monday-Friday, 8:30-5:00. The office is in Student Union 301 and the phone number is (213) 740-0776.

Course Syllabus

PART I- Earth's Climate as a Dynamic System

Week 1 (Chapter 1: Earth's Climate as a Dynamic System)

Mon. Aug. 26, Introduction: The Scientific Method, Questions, Hypotheses, Theory

Assignment: Read Chapter 1.

Wed. Aug. 28, Importance of the Climate System

Fri. Aug 30, Current Climate Paradigm

Assignment: review and answer Questions at the End of Chapter 1.

Week 2 (Chapter 2) Observing Climate Change

Mon. Sept. 02, **Labor Day Holiday**

Wed. Sept. 04, Climate System Variables, Observing, Detecting and Assessing Change vs Variability

Assignment: Chapter 2.

Fri. Sept. 06, How Climate System Observations are Used

Assignment: Review and Answer Questions at the End of Chapter 2.

Week 3 (Chapter 3) Tools for Investigating Earth's Climate

Mon. Sept. 09, Measures using Statistical Procedures

Wed. Sept. 11, Measures using Statistical Procedures,

Assignment: Read Global Climate Change, Chapter 3.

Fri. Sept. 13, GeoSpatial Analysis

Assignment: Review and Answer Questions at the End of Chapter 3.

PART II Principles of Climatic Processes

Week 4 (Chapter 4) Radiation and Heat in the Climate System

Mon. Sept. 16, Energy and Entropy (Distributed Energy, The Greenhouse Effect)

Assignment: Read Chapter 4.

Wed. Sept. 18, Global Radiation Budget (Incoming vs Outgoing Energy)

Fri. Sept. 20, Controls on Climate Characteristics (clouds, ocean circulation)

Assignment: Review and Answer Questions at the End of Chapter 4.
Week 5 (Chapter 5) Water in Earth's Climate System

Mon. Sept. 23, Properties of Water in Earth's Climate System

Assignment: Read Global Climate Change, Chapter 5.

Wed. Sept. 25, Humidity and Saturation

Fri. Sept. 27, Atmospheric Stability (Clouds and Precipitation Types)

Assignment: Review and Answer Questions at the End of Chapter 4.

Week 6 (Chapter 6) Global Atmospheric Circulation

Mon. Sept. 30, **Midterm 1**

Wed. Oct. 02, Forces that Cause Air to Move

Assignment: Read Chapter 5. Review and Answer Questions in Chapter 6.

Fri. Oct. 04, Winds

Week 7 (Chapter 7) Atmosphere-Ocean Relationships

Mon. Oct. 07, Air-Sea Interactions, Ocean Circulation

Assignment: Read Global Climate Change, Chapter 7

Wed. Oct. 09, El Niño, La Niña and the Southern Oscillation, The Monsoons

Assignment: Review and Answer Questions at the End of Chapter 7.

Fri. Oct. 11, Changing Ocean in a Changing Climate (carbon uptake, ocean acidification, sea level rise)

PART III Variability of the Climate

Week 8 (Chapter 8) Natural and Anthropogenic Drivers of Climate Change

Mon. Oct. 14, Natural Drivers of Climate Change

Assignment: Review and Answer Questions at the End of Chapter 8.

Wed. Oct. 16, Feedbacks and Biogeochemical Cycles

Fri. Oct. 18, **Fall Recess (No Class)**

Week 9 (Chapter 9) Paleoclimatic Investigations: Reflecting Back

Mon. Oct. 21, Reconstructing Climate of the Past

Assignment: Read Global Climate Change, Chapter 9

Wed. Oct. 23, Climate Changes over Geologic Time

Fri. Oct. 25, The Appearance of Humans and the Ice Ages

Week 10 (Chapter 10) Future Projections and Extremes of Climate

Mon. Oct. 28, What are Models?

Wed. Oct. 30, Assessing Climate Output

Assignment: Review and Answer Questions at the End of Chapter 10

Fri. Nov. 01, Projections of Weather Extremes

PART IV Our Relationship to Climate Variability

Week 11 (Chapter 11) Human and Ecosystem Vulnerabilities

Mon. Nov. 04, **Midterm 2**

Assignment: Read Global Climate Change, Chapter 11

Wed. Nov. 06, Ocean and Cryosphere Vulnerabilities (sea level rise, shrinking glaciers)

Fri. Nov. 08, Biosphere Vulnerabilities

Week 12 (Chapter 12) Climate Change Mitigation and Energy Use

Mon. Nov. 11, Energy-CO₂ Connection

Assignment: Read Global Climate Change, Chapter 12

Wed. Nov. 13, Renewable Energy Sources

Fri. Nov. 15, Geoengineering the Climate System

Week 13 (Chapter 13) Human Needs, Actions and Public Policy

Mon. Nov 18, Climate Policy Making at the National Level

Assignment: Read Global Climate Change, Chapter 13

Wed. Nov. 20, Mitigation and Adaptation

Fri. Nov. 22, Climate Change: The Economic Perspective

Week 14 (Chapter 13 continued)

Mon. Nov 25,

Wed. Nov. 27, **Thanksgiving Break**

Fri. Nov. 29, **Thanksgiving Break**

Week 15 (Chapter 14) Climate Studies as a Scientific Endeavor in a Changing Society

Mon. Dec. 2, Resistance to Climate Change Evidence

Assignment: Read Global Climate Change, Chapter 14

Wed. Dec. 04, Disparaging Science and the Climate Scientist

Fri. Dec. 06, last day of class

Week of Dec. 11-18 Final Exams

Course Policies and Grading

Grading and Grade Calculation

In Class Questions: 5%. We'll be using the Top Hat Software that you will download onto your smart device (phone, tablet or laptop). There will be one or two questions each class starting in week 3. The questions are intended to give me feedback on the class progress on topics we are covering in lecture. Answering the questions is required and you will be given credit whether your answer is correct or incorrect.

Lab Portion: 25% of course

Lecture Exams: 25% of course. 2 midterms

Homework (multiple choice questions from each chapter): 20%

Final exam =25%

Calculating Your Final Course Score

$((0.05 * \text{In class}) + (0.25 * \text{Lab}) + (0.25 * \text{Midterms}) + (0.25 * \text{Final Exam}) + (0.20 * \text{Homework}) = \text{Final Course Score}$

Notes about Exams

Midterm Exams (2), 50 questions. Each question is worth 1pt.

Final exam 100 questions. Each question is worth 1pt

Exams will be multiple-choice questions.

No early exams are allowed.

Exams must be taken at the scheduled time.

Students who do not take an exam receive zero points as a grade on that exam.

Make-up exams can be only taken in cases of illness or family emergency or other university event.

Make-up exams are scheduled and set by the instructor.

Notes about Grade Curves

A curve is applied to the final score distribution at the end of the semester.

USC Statement on Academic Conduct and Support Systems

Academic Conduct:

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Part B, Section 11, “Behavior Violating University Standards” policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, <http://policy.usc.edu/scientific-misconduct>.

Support Systems:

Student Counseling Services (SCS) – (213) 740-7711 – 24/7 on call

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention. engemannshc.usc.edu/counseling

National Suicide Prevention Lifeline – 1 (800) 273-8255

Provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week. www.suicidepreventionlifeline.org

Relationship and Sexual Violence Prevention Services (RSVP) – (213) 740-4900 – 24/7 on call
Free and confidential therapy services, workshops, and training for situations related to gender-based harm. engemannshc.usc.edu/rsvp

Sexual Assault Resource Center

For more information about how to get help or help a survivor, rights, reporting options, and additional resources, visit the website: sarc.usc.edu

Office of Equity and Diversity (OED)/Title IX Compliance – (213) 740-5086

Works with faculty, staff, visitors, applicants, and students around issues of protected class. equity.usc.edu

Bias Assessment Response and Support

Incidents of bias, hate crimes and microaggressions need to be reported allowing for appropriate investigation and response. studentaffairs.usc.edu/bias-assessment-response-support

The Office of Disability Services and Programs

Provides certification for students with disabilities and helps arrange relevant accommodations. dsp.usc.edu

Student Support and Advocacy – (213) 821-4710

Assists students and families in resolving complex issues adversely affecting their success as a student EX: personal, financial, and academic. studentaffairs.usc.edu/ssa

Diversity at USC

Information on events, programs and training, the Diversity Task Force (including representatives for each school), chronology, participation, and various resources for students. diversity.usc.edu

USC Emergency Information

Provides safety and other updates, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible. emergency.usc.edu

USC Department of Public Safety – UPC: (213) 740-4321 – HSC: (323) 442-1000 – 24-hour emergency or to report a crime.

Provides overall safety to USC community. dps.usc.edu

