

Geography 171: Climates of the World, Prof. Norm Miller

Tuesdays and Thursdays, 11:00 – 12:30, McCone 145, 3 Credits

Two Exams (2 @ 25% each), Homework (4 @ 10% each), Class Participation (10%)

Text: Atmosphere, Weather & Climate by Roger Barry and Richard Chorley

We begin with a very basic description of atmospheric dynamics and physics at the large scale, followed by region-specific climate systems. We'll look at regional responses to climate change and the inter-relationships between the role of climate variations and impacts. Each week's reading will be integrated into class participation, which will be during the latter half of each class. Class will typically begin with a weekly weather in review that focuses on a specific geographic region, followed by the topic of the day, a break, and class discussion of weather events and impacts related to the topic. There will be four homework sets to reinforce specific topics, a mid-term and final exam. Guest Lectures will be on special topics, dates have not yet been finalized. *All material is posted on bspace.*

25 Aug: Introductions, Course Outline, Goals and Expectations

A brief history of meteorology; Earth-Sun Relationship

30 Aug: Atmospheric Composition

Atmospheric composition, mass, vertical structure
Montreal Protocol, Lessons Learned.

Reading: Chapter 1 & 2
HW1 hand out

1-8 Sept: Conservation of Energy

Earth heat budget, short-wave and long-wave radiation,
Arrhenius' GHG calculation, Keeling's CO₂ observations
Brief summary of the IPCC Fifth Assessment Report

Reading: Chapter 3

13 Sept: The Balance of Evidence **Guest Lecture: Dr. Ben Santer (PCMDI/LLNL) ***

15-20 Sept: Atmospheric Moisture and Conservation of Water

The Water Cycle and precipitation climatology patterns.
Water States – Solid, Liquid, Vapor; Polar Regions

HW1 due
HW 2 hand out
Reading: Chapter 4

22-29 Sept: Lapse Rates

Atmospheric air mass stability, instability, buoyancy
Precipitation types and formation, thunder and lightning

4 Oct REVIEW

HW 2 due

6 Oct: **Midterm Exam I *******

11&13 Oct: Principals of Horizontal Motion Geostrophic Flow

Pressure Gradient Force, Coriolis Force, Friction Force

Reading: Chapter 5
HW3 handed out

18&20 Oct: Conservation of Mass and Momentum

Pacific Equatorial Heat Engine, Divergence and Convergence.

25-27 Oct: large-Scale Circulations

Hadley Cell, Ferrell Cell, Polar Front,
El Nino Southern Oscillation and the Walker Circulation.

1 Nov: Brazil Drought, the role of Atlantic SSTs **Guest Lecture: Prof. John Chiang***

3 Nov: Brazil Paleo-Climate **Guest Lecture: Prof. David Wahl***

8 Nov: Warm and Cold Fronts, Mid-Latitude Cyclones

10-15 Nov: Local Winds, Sea Breeze, and Monsoon Circulations

17 Nov: Indian Ocean Dipole phases and impacts **HW 3 due**

22 Nov: Antarctic Weather and Climate Change, Short movie: Sailing to the WAIS

15 Nov: Indian Ocean Dipole phases and impacts

HW 3 due

17 Nov: Tibet, SE Asia Rivers, Three Gorges Dam and its impacts **HW 4 handed out**

22 November: General Overview of the climate and hydrology

East Africa, Lake Victoria and the Nile River

Congo convective systems, lightning, introductory cloud physics, Lake Victoria

hydroclimate and impacts. Sahel drought mechanisms, impacts, famine

29 Nov: Extreme Weather

Guest Lecture: Dr. Michael Wehner (LBNL)*

Present and projected tropical cyclones and hurricanes., diagnosing component of the hydrologic cycle.

1 Dec: Review for Final **HW 4 due 12/1**

12-16 Dec: Final Exam (Date TBD) *

***Dates to be confirmed**