# Climate Change Curriculum

UC Berkeley offers many courses that address global climate change, directly and indirectly.

Letters and Science 70B provides a lower-division introduction to the physical and social dimensions of climate change. We are developing a core list of upper-division courses that address different aspects of climate change in greater detail: physical sciences, impacts/ adaptation, mitigation/ policy, and humanities/ historical background. The following course list is not meant to be exhaustive, but rather to span the range of key climate change themes.

We are still working on the list. It is possible that this list may turn into a minor in the College of Letters and Sciences.

**Please send questions and comments to** andfried@atmos.berkeley.edu.

## Physical Science

**Geography 142: Climate Dynamics**

This course examines how various components of the climate system--the atmosphere, ocean, land, and cryosphere--interact in determining its observed state. Covered topics: observations of the climate system; the earth's energy balance; atmospheric radiative transfer; the surface energy balance; the hydrologic cycle; atmospheric circulation and its relation to the energy balance; the role of the ocean and the cryosphere. Additional topics, as time permits, will cover climate change, natural and anthropogenic; and computer modeling of climate.

**Geography C139 / Earth and Planetary Science C181: Atmospheric Physics and Dynamics**

This course examines the processes that determine the structure and circulation of the Earth's atmosphere. The approach is deductive rather than descriptive: to figure out the properties and behavior of the Earth's atmosphere based on the laws of physics and fluid dynamics. Topics will include interaction between radiation and atmospheric composition; the role of water in the energy and radiation balance; governing equations for atmospheric motion, mass conservation, and thermodynamic energy balance; geostrophic flow, quasigeostrophic motion, baroclinic instability and dynamics of extratropical cyclones.

**Earth and Planetary Science/ Environmental Science, Policy and Management C180: Atmospheric Chemistry**

An introduction to air pollution and the chemistry of earth's atmosphere. The fundamental natural processes controlling trace gas concentrations in the atmosphere, and how anthropogenic activity has affected those processes at the local, regional, and global scales. Specific topics include stratospheric ozone depletion, increasing concentrations of greenhouse gases, smog, and changes in the oxidation capacity of the troposphere.

## Impacts/ Adaptation

**Energy and Resources 290: Climate Change Impacts and Adaptation**

An intensive seminar with case studies on climate change predictions; impact scenarios; adaptation options, and the interrelationships among impacts, adaptation, and mitigation. (Emphasis will be on natural systems and natural sciences, but not exclusively. It will be taught every other year. The course matter will evolve during the first few times it is taught but then should settle into a formal class.)

## Mitigation/ Policy

**Environmental Economics and Policy C175/ International Area Studies C175: The Economics of Climate Change**

The course will start with a brief introduction and evaluation of the scientific aspects behind climate change. Economic models will be developed to analyze the impacts of climate change and provide and critique existing and proposed policy tools. Specific topics studied are impacts on water resources and agriculture, economic evaluation of impacts, optimal control of greenhouse gases, benefit cost analysis, international treaty formation, discounting, uncertainty, irreversibility, and extreme events.

**Civil and Environmental Engineering 107: Climate Change Mitigation**
Assessment of technological options for responding to the threat of climate change. Overview of climate-change science: sources, sinks, and atmospheric dynamics of greenhouse gases. Current systems for energy supply and use. Renewable energy resources, transport, storage, and transformation technologies. Technological opportunities for improving end-use energy efficiency. Recovery, sequestration, and disposal of greenhouse gases from fossil-fuel combustion. Societal context for implementing engineered responses.

## Historical Background

There is no course that directly addresses the modern history of climate change, but the history of the industrial revolution is relevant to understanding the issue.

**History 161: Emergence of Modern Industrial Societies**
History 161 attempts to provide survey historical background for understanding modern political, economic and cultural institutions of the major industrial countries an excursion from the pre-industrial to what some have been calling the post-industrial world. The course requires no special training in economics, and no formal course prerequisites, but a survey knowledge of world history at least since 1500 is recommended. It is an advanced course and will be difficult for slow readers and for students with no knowledge of history.