

UC Berkeley OLLI Syllabus  
**Global Warming: More than an Inconvenient Truth**

*Course description:*

This course covers the most salient issues in global warming, focusing mainly on the science but with excursions into the world of politics, climate skepticism, and fossil fuels. The subtitle implies that we will look beyond the subject itself, toward its implications for humanity's management of the Earth, whether intentional or inadvertent. We will first review the history of global warming research starting 200 years ago. Then we will see: how and why the subject exploded in the 1980s and its current status; who organized the campaign against climate science and their motives; proposals for human management of the climate (geo-engineering); and how research into past climates has illuminated our present and future climate, including new discoveries about abrupt climate change. We will finish with recent speculations about the long-term future of climate and of life on Earth.

*Week by week:*

- (1) History of global warming research going back to Fourier in the early 1800s, Tyndall's 1850s experiments on greenhouse gases, Arrhenius' 1896 climate model calculating the effect of changing CO<sub>2</sub>, Callendar's 1930s efforts to raise the alarm, and the modern revival beginning in the 1970s due to Wally Broecker, Steve Schneider, Jim Hansen, and other pioneers.
- (2) Why the global warming subject exploded in the 1980s: the recognition of other greenhouse gases besides CO<sub>2</sub>; the role of Jim Hansen and his Congressional testimony of 1988; the rapid development of climate models; the formation of the Intergovernmental Panel on Climate Change (IPCC); new discoveries about the role of clouds; the continuing failure to home in on a definitive answer to the question "What happens when we double CO<sub>2</sub>?"
- (3) The climate denial movement of the 1990s: who organized it, what their "points" are, and why their disinformation campaign worked so well. How the front men for the campaign had previously spread doubt about cancer and smoking and other subjects that threatened various industries. How the US became the only country in the world whose government officially denies the existence of climate change and/or the human role.
- (4) Stopgap measures against climate change: carbon capture and sequestration; solar radiation management; cloud management; and other so-called geo-engineering strategies. The prospects for continued ocean acidification in spite of these methods.
- (5) The explosive growth of knowledge about past climates: times of abrupt climate change in the past; past times of great global warming like the Cretaceous and the Paleocene Thermal Maximum and what they teach us about the role of greenhouse gases; mass extinctions and what they tell us about the current extinction caused by humans.

(6) How much time does human life on Earth have left? Why Earth will become barren long before our Sun turns into a red giant, due to the slow inexorable decline of CO<sub>2</sub> in the atmosphere. Prospects for “hot-tub Earth” where average temperatures reach 104F, and for an eventual runaway greenhouse like Venus.

*Expected areas of basic scientific knowledge:* You will derive much more from this course if you brush up on the following basic physics and chemistry, equivalent to that taught in good high-school courses on these subjects:

- \* how energy is conserved but changes into different forms (radiation, heat, kinetic, ...);
- \* heating and cooling of Earth/air/ocean by radiation, convection, and conduction;
- \* water: evaporation, condensation, sublimation, freezing; physical properties;
- \* radiation: Kirchoff, Stefan-Boltzmann and Planck Laws; absorption spectra of gases; emission, absorption, scattering of radiation by gases, airborne particles, and the surface;
- \* chemistry of carbon in the air and ocean (for CO<sub>2</sub> cycle);
- \* Newton’s Laws of Motion (for motions of air/ocean)

Samples of background materials (the Wiese videos are among my favorites):

[https://www.dropbox.com/sh/gxqwu8b5d2qxxtj/AABLU3sOzwRQ\\_tBmoeZ6uEK0a?dl=0](https://www.dropbox.com/sh/gxqwu8b5d2qxxtj/AABLU3sOzwRQ_tBmoeZ6uEK0a?dl=0)

<https://www.youtube.com/watch?v=ZzCA60WnoMk>

<https://www.youtube.com/watch?v=tX3Y5bzNDiU>

<https://www.youtube.com/watch?v=qSUX8hhyp98>

[https://www.youtube.com/watch?v=X\\_1Z6zz2peY](https://www.youtube.com/watch?v=X_1Z6zz2peY)

<https://www.youtube.com/watch?v=9eU6a6sZp-o>

<https://www.youtube.com/watch?v=a-WFKu8j7Y4>

(YouTube and Khan Academy are a great source of videos on the background subjects.)

I will provide a number of PDF and MP4 files for the course, and you should feel comfortable with such files, and with accessing YouTube and Wikipedia.

*Reading list:*

(0) Bennett, A Global Warming Primer (<http://www.globalwarmingprimer.com>)

(1) Mann and Kump, **Dire Predictions: Understanding Global Warming**  
(Glossary is excellent overview of course topics)

(2) best discussion of the history: Weart, **The Discovery of Global Warming**

*Instructor bio:* Dr. Warren Wiscombe graduated from MIT and Caltech in physics and applied math. He has done research in the climate science field since the early 1970s, specializing in the interaction of solar and infrared radiation with the Earth’s atmosphere and surface -- subjects at the heart of global warming. He worked at NASA Goddard Space Flight Center and at the National Center for Atmospheric Research and taught climate at several universities. He has previously taught OLLI classes on paleoclimate and on exoplanets.

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