

Theme: Energy & Climate

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Class hours: Thursdays, 4:00 pm to 4:55 pm in **B-131**

First day of class: August 31

No class on November 23

Last day of class: December 7

Office hours: Thursdays, 2:45 pm to 3:45 pm, or by appointment

Course Objectives

Illustrate the many connections among multiple branches of science and with other disciplines, including economics, sociology and policy

Understand the science behind the energy challenge and climate change

Enhance written communication skills

Students' Work

- Pre-lecture readings/videos
- Weekly problem assignments
- Periodic reading and writing assignments

Course Grading

70 % problem sets

30% written assignments

Attendance

Mandatory. A full letter grade lowered for every three lectures missed.

Resources

Introductory Physics. Any college-level textbook can do it.

An Inconvenient Truth, Al Gore, Rodale, New York, 2006

Hot, Flat, and Crowded, Thomas L. Friedman, Farrar, Straus and Giroux, New York, 2008

Sustainable Energy – without the hot air, David JC MacKay, UIT, Cambridge, 2009

Available free online at <http://www.withouthotair.com/download.html>

Beyond Smoke and Mirrors, Burton Richter, Cambridge U. Press, 2010

The Quest, Daniel Yergin, Penguin, New York, 2011

Energy for Future Presidents, Richard Muller, W. W. Norton, New York, 2012

Energy Information Administration – *National data center for energy*

Online at <https://www.eia.gov/>

International Energy Agency – *world energy statistics*

Online at <http://iea.org>

New York State Independent System Operator (*NYISO*) – *NY electric system and market*

Online at <http://www.nyiso.com/public/index.jsp>

Intergovernmental Panel on Climate Change (*IPCC*) – *Periodic reports*

Online at <http://www.ipcc.ch>

Energy and Climate

Syllabus

A. Introduction: the Present

1. Energy and energy consumption
2. Climate and factors that affect it. The greenhouse effect

B. Evolutionary Changes

1. Better transportation. Efficiency and thermodynamics
2. Better fossil fuels and more efficient processes. Catalysis
3. Better heating and better gadgets. Heat transfer

C. Drastic Changes

1. Solar energy. The photoelectric effect
2. Nuclear energy. Nuclear physics
3. Other renewable sources: wind, biofuels, hydro-electric, etc

D. Roadblocks

1. Energy storage. Batteries and capacitors
2. Energy transmission. Superconductivity

E. Other Elements in the Equation

1. Economics of Energy
2. Energy & Climate Policy

Date	Topic
Aug. 31	<i>Energy and energy consumption</i>
Sept. 7	<i>Climate and factors affecting it</i>
Sept. 14	<i>Better transportation</i>
Sept. 21	<i>Better fossil fuels</i>
Sept. 28	<i>Better heating and better gadgets</i>
Oct. 5	<i>Solar energy 1</i>
Oct. 12	<i>Solar energy 2</i>
Oct. 19	<i>Nuclear energy 1</i>
Oct. 26	<i>Nuclear energy 2</i>
Nov. 2	<i>Other renewable energy sources</i>
Nov. 9	<i>Energy storage</i>
Nov. 16	<i>Energy transmission</i>
Nov. 30	<i>Economics of energy</i>
Dec. 7	<i>Energy and climate policy</i>