

GEOL 076  
**ENERGY RESOURCES FOR A HUNGRY PLANET**



Our hunger for energy is melting the ice caps

**MWF ROOM 205 MITCHELL HALL 11:00am – 11:50am**

**Instructor:** Prof. Jose A. Rial, office #319, Mitchell Hall

**Office Hours:** Thurs. 11 am - 1 pm

**Themes for discussion**

**Part I. Energy, its types and sources**

Introductory definitions, energy, energy conservation, work. Types of energy: kinetic, potential. Energy transformation. The primary sources of energy: Fossil fuels, nuclear (fission and fusion), hydropower, geothermal, solar, wind, tidal, ocean thermal.

Recommended web sites:

<http://www.energy.gov>

<http://www.worldenergy.org/>

<http://www.unesco.org/>

**Part II. Sources of fossil fuels**

Fossil fuels supply and demand. How and where to find oil, gas and coal. The typical reservoirs, geologic and geophysical techniques to extract fossil fuels. World reserves and current production. The geo-politics of oil. Critical areas: The Caspian basin, Iraq, Alaskan Arctic National Wildlife Refuge, South America.

Recommended web sites:

<http://www.fe.doe.gov/>

<http://energy.usgs.gov/>

### **Part III. Alternative energies. The challenge of sustainability**

Fusion, the energy of the sun. Geothermal energy, a clean inexhaustible alternative to fossil fuels. Geothermal resources of the US and the world. The Pacific rim. Solar power research. Biofuels. Wind farms. Energy from the tides. New energy technologies. Hydrogen fuel cells. NARNEA, the North American solution.

Recommended web site:

<http://www.nrel.gov/>

### **Part III. Global warming: The science, the history and the controversy.**

Energy use and human resources. Energy resources and environmental protection. The increasing energy demands of a growing population and its immediate consequences. Energy conservation. Emission of anthropogenic gases. The enhanced greenhouse effect. Consequences of global warming. Global Environmental Policy. Energies of the future.

Recommended web sites:

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

<http://www.epa.gov/>

### **Student Evaluation**

Evaluation of this course is based on 100% homework and class assignments. Homework will usually require the student to research and corroborate information on important questions raised in class by the teacher or by the students. Collective efforts are encouraged.

A final presentation and paper will be due the day of the final exam. The paper should be no longer than three pages (single spaced; excluding bibliography and figures).

### **Reading material**

Students will be given reading assignments, the sources of which vary with the topic. Main sources include information posted on the web sites listed above and review papers published by government agencies (USGS, US Congress, NASA) and international organizations such as the World Energy Council, the United Nations, the Intergovernmental Panel on Climate Change, etc.

### **Recommended and reference books**

*Energy Environment and Climate*, by Richard Wolfson, W.W. Norton (2011). Also recommended:

*Out of Gas*, by D. Goodstein, WW Norton, Pub., 2004.

*The End of Oil*, by P. Roberts, Houghton Mifflin, 2004.

*Beyond Oil*, by K.S. Deffeyes, Hill & Wang Pub. 2005.