Energy and Society
Physics 20051, Energy 20101, and STV20304
T, Th 3:30-4:45pm
NSH 184

Course Description: A course developing the basic ideas of energy and power and their applications from a quantitative and qualitative viewpoint. The fossil fuels (coal, oil, natural gas) are studied together with their societal limitations (pollution, global warming, diminishing supply). Nuclear power is similarly studied in the context of the societal concerns that arise (radiation, reactor accidents, nuclear weapons proliferation, high-level waste disposal). The opportunities as well as the risks presented by alternative energy resources, in particular solar energy, wind, geothermal, and hydropower, together with various aspects of energy conservation, are developed and discussed.

Instructor: Professor Ani Aprahamian
183 Nieuwland Science Hall
Telephone: 631-8120
Email: aapraham@nd.edu
Office Hours: by appointment and Tuesdays 4:45-6:30pm

Webpage: http://isnap.nd.edu/Lectures/phys20051/
Syllabus
Homework assignments
Lecture Notes
Schedule

TA: Weichuan Li Email: Weichuan.Li.148@nd.edu
Tony Battaglia Email: abattagl@nd.edu
Room: 180C NSH
Office Hours: Thursdays 2:00-3:30 pm
Thursdays 5:00-6:30 pm

Gordon J. Aubrecht

Reports: To name a few........“America’s Energy Future”
National Academies Report

“New Science for a Secure and Sustainable Energy Future”
..a report of a subcommittee to the Basic Energy Sciences Advisory Committee
(December 2008) + many other reports!
http://search.nap.edu/napcgi/de.cgi?term=%E2%80%9CNew+Science+for+a+Secure+and+Sustainable+
Energy+Future%E2%80%9D&GO.x=27&GO.y=11
“Energy=Future..think Efficiency”
http://www.aps.org/policy/reports/index.cfm

Books:

How to Cool the Planet? Geo-engineering and the audacious quest to fix Earth’s Climate by Jeff Goodell

Energy, Environment, and Climate by Richard Wolfson


Energy Transitions, History, Requirements and Prospects by Vaclav Smil

The Climate War (True Believers, Power Brokers, and the Fight to Save the Earth) by Eric Pooley

Energy & the Environment: Choices and Challenges in a Changing World
By Reza Toossi

Energy & the Environment, 2nd Ed. By Ristinen and Kraushaar

Introduction to Renewable Energy by Nelson

Principles of Sustainable Energy by Kreith

Many more on Fossil Fuels, Alternative Energy Resources, Nuclear Power…

Movies:

“Carbonnation”
“An inconvenient Truth”
“A Global Warning?” History Channel program
“Six Degrees Could Change the World” National Geographic
“Planet in Peril”
“Hydropower: Brazil, Paraguay, Argentina”

Course Philosophy: How are we going to do this?

We will have lectures given by Professor and visiting professors on Various Energy Fundamentals, Fossil Fuels, Renewable Energy Resources (Wind, Solar, Geothermal, Biomass), Nuclear Energy, Energy Conservation, Transportation, Architecture (Residential and Industrial), and Global Effects. There will be homework problems assigned. On any given topic, you will have a brief introduction by the professor, followed by assigned reading and homework problems. You are expected to come to class ready to discuss topics from the reading and aware of any new developments in the news on the topic to be discussed. The final examination requirement will be fulfilled by a research project done in groups of 2 or 3.
Some possible topics are listed below, all research projects are to be determined in consultation with Professor and decided at the very latest by October 25.

Some sample topics to include:

1. Moral and Ethical Issues of Consumption
2. National Security of garnering the necessary energy resources (fossil fuels, other)
3. Political and Geopolitical Instabilities associated with Energy requirements
4. Financial Considerations of energy transitions (wood to fossil fuels to other energy resources)
5. Science for a Secure and Sustainable Energy Future
6. How to address the challenges of Energy in the US?
   - Energy Independence.
   - Environmental Sustainability.
   - Economic Opportunity.

7. Reducing Greenhouse Gases, Is it possible?
8. Cooling the Earth?
9. Efficiency: Electricity Transmission and Distribution? The GRID
10. Efficiency: Appliances, Automobiles, Architecture
11. Challenges of Nuclear Energy
12. Challenges of Solar Energy/Wind/Geothermal/Hydropower/etc.
13. Marketing Energy Conservation to the public: What are the real prospects?
14. Energy policies in G-20 countries (or some subset of countries: Eurozone, Asia, South America, etc.)

Class Research Projects assigned to groups of 2 or 3: Decision by October 25
Paper due on last day of Class Dec. 8, 2011

Course Grade:  
25% Homework problems
25% Examination 1 (September 22, 2011)
25% Examination 2 (November 3, 2011)
25% Research Project (approval deadline October 25, 2011)

Homework Problems will be assigned as we go along