ECON 699 Spring 2011
Renewable Energy Economics and Policy
MW 1:30-2:45, BUSAD D301

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Office Hours: MW 3:00-4:15

*Upon approval of Renewable Energy and Island Sustainability (REIS) Graduate Certificate Program, this course will satisfy a core-course requirement for the certificate. The course will not count as a field course for Economics PhD students. The course could satisfy the area of concentration requirement for Economics MA students. The instructor’s approval is required for registration.

*Please register for 3 credits.

Learning Objectives and Course Content:
This course reviews economic and policy aspects of renewable energy issues. In order to help students see renewable energy issues in perspective, the course will also review non-renewable, conventional energy sources including fossil fuel. Topics include the economics of major renewable energy options (e.g. bioenergy, wind, solar, and geothermal energy) as well as the energy mix between various fossil-fuel and renewable energy options. Students will learn about:

1. Basic economic concepts for analyzing renewable energy development;
2. Major criteria used in policy discussions (e.g. efficiency, energy security, sustainability);
3. Major positive and normative issues and analytical tools in renewable energy economics and policy.
4. The current market structures of nonrenewable and renewable energy options;
5. How to analyze the effects of alternative renewable-energy policies, with applications to renewable energy development in Hawaii.

Prerequisites:
College calculus and principles of economics, or consent.

Course Requirements:
Problem Sets 20%
Midterm 20%
Final exam 30%
Group project, presentation, participation: 30%

There will be periodic problem sets to understand the theory of energy economics and policy and to apply the theory in the context of renewable energy. The problem sets consist of (i) analytical exercises that involve calculus in order to understand decision making by energy producers, consumers, and regulators as well as market allocations of energy; (ii) cost-benefit analysis...
exercises of renewable energy policies, and (iii) short-essay questions on renewable energy policies.

In class, you will be asked to present an overview of a selected renewable energy option from an economics point of view. The instructor will guide you in terms of the references and the content of your presentations.

You will also participate in a group project addressing the policy aspects of renewable energy options in Hawaii, where you apply cost-benefit analysis and/or other research tools.

Textbooks
There is no required textbook. However, the lectures will draw on several references including the following optional textbooks:

Most of the readings for the course are journal articles, and will be (mostly) available at Laulima.

Topics to be covered

0. Introduction: why economics and policy for energy?
   a. Energy use in historical perspective
   b. Why economics
   c. Measurements and key concepts of energy
Readings:
Dahl Ch 1
OECD/IEA World Energy Outlook 2010
US Energy Information Agency (EIA) Energy Basics 101

1. Basics of energy economics and policy
   a. Supply, demand, market equilibrium, price elasticity
   b. Market power
   c. Natural monopoly and utility regulation
   d. Externality
   e. Discounting and project finance
f. Gains from trade, energy-import dependence, energy security, opportunity cost

g. Sustainability

Readings:

2. Overview of major fossil-fuel energy options and nuclear power

a. Coal: market structure, “clean coal,” carbon capture and sequestration
   MIT The Future of Coal http://web.mit.edu/coal/
   US EIA on coal US EIA on coal
   http://www.eia.gov/energyexplained/index.cfm?page=coal_home

b. Oil: world oil market, energy security, the price trend in the past and the future
   US EIA on oil http://www.eia.gov/energyexplained/?page=oil_home
   On global oil market structure:
   http://nordhaus.econ.yale.edu/recent_stuff.htm

c. Natural Gas: regulation, deregulation, and markets
   US EIA on natural gas
   http://www.eia.gov/energyexplained/index.cfm?page=natural_gas_home
   MIT The Future of Natural Gas

d. Nuclear power: energy security and waste management)
   US EIA on nuclear energy
   http://www.eia.gov/energyexplained/index.cfm?page=nuclear_home
   MIT The Future of Nuclear Power http://web.mit.edu/nuclearpower/

Other readings: BERSW Ch. 5, 6, 7, 8, 14, Dahl Ch. 3, 6, 7.

3. Economic and policy aspects of electricity generation

a. Generation, transmission and distribution

b. Public utility regulation, rates-of-return regulation, and electricity pricing

c. Smart grid and information security

d. Energy efficiency and energy conservation

Readings:
VHV Ch. 11, Ch. 12
4. Overview of major renewable energy options
   a. Hydropower
   b. Solar power (thermal and photovoltaic, decentralized vs centralized)
   c. Wind power
   d. Biofuels
   e. Geothermal, ocean thermal energy conversion, energy storage technology, and other options

MPS Ch 4, 5.

5. Policies of renewable energy
   a. Price-based instruments including feed-in tariffs
   b. Quantity-based instruments including renewable portfolio standards
   c. Subsidies and tax credit for energy development

Readings:
MPS Ch 11.
DSIRE: Database of State Incentives for Renewables & Efficiency. [http://www.dsireusa.org](http://www.dsireusa.org).

6. Energy use and renewable energy potential in Hawaii

7. Topics: US national aspects and global aspects of renewable energy
   a. Energy demand and supply in the long run
   b. Climate change and other environmental constraints


8. Topics: Renewable energy in the context of climate-change policies
   a. Economics of climate change: how much greenhouse gas emissions should be controlled, and how fast?
   b. Policies to reduce GHG emissions and their implications to renewable energy development: emissions tax, emissions trading, voluntary approaches, carbon credits and offsets
   c. International agreements on climate change mitigation
d. Renewable energy policies in the context: renewable energy certificates REC, climate registries

Readings:
Stern Review and discussions by William Nordhaus, Martin Weitzman, Partha Dasgupta, Geoffrey Heal, etc.

Disability Access
If you feel you need reasonable accommodations because of the impact of a disability, please: (1) contact the KOKUA Program (V/T) at 956-7511 or 956-7612 in room 013 of the QLCSS (Queen Lili‘uokalani Center for Student Services); (2) speak with me privately to discuss your specific needs. I will be happy to work with you and the KOKUA Program to meet access needs related to a documented disability.