Course Syllabus

University of California – San Diego

Economics 132
Energy Economics
Fall Quarter 2003

Instructor: Prof. Ahmad Seifi
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Office Hours: W. 1:00-3:00 p.m.

Prerequisites: Economics 1A-B or 2A-B.

Teaching Assistants:

Jared Janowiak Office Hours: Tu, Fr 1:00 – 2:00 p.m. ; Office: Economics 116
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Course Description

This course applies microeconomic concepts to energy resource problems. Particularly, we draw from capital theory (time discounting and the theory of exhaustible resources), welfare economics (surplus calculations, property rights, and externalities), and industrial economics. The topics will include the theory of exhaustible resources, the world oil market, natural gas economics, coal, electricity economics, nuclear energy and safety, externalities and pollution, and energy derivatives. We will also discuss other topics such as natural resource scarcity and sustainability, and the relation between energy and macroeconomy if time permits.

Textbooks:

1. Energy Economics: A Modern Introduction
   Author: Ferdinand E. Banks
   Kluwer Academic Publishers, 2000

2. The Economics of Natural Resource Use, 2nd Edition
   Authors: John M. Hartwick and Nancy D. Olewiler
   Addison-Wesley- Longman publishing co., 1998

These texts are required. You will find them available at UCSD campus bookstore.

Exams and Grading Procedure: Grades will be based on three exams. Each exam will carry a weight of 1/3. The exams will take place on the following dates:

Exam 1 : Tu., October 14
Exam 2: Tu., November 4
Exam 3 : Tu, December 2

No make-up exams will be given. If you miss an exam, you will receive a score of zero for that exam.

The course grade will be based on a "curve" which will, in turn, depend on the class performance as a whole. So, your grade will really depend on how well you do in relation to the rest of the class.

Outline of the Topics:

1. Introduction

What is so special about natural resources? Natural resources and property rights; various types of energy resources; primary and secondary energy; U.S. energy consumption and production; Review of some concepts from welfare economics and decisions over time.

Readings: Banks, chapters 1, 2
Hartwick and Olewiler, chapter 1

2. The Theory of Exhaustible Resources

The theory of mine; optimal extraction by a competitive industry; Hotelling's rule; empirical tests; extraction, resource prices and backstop technology; extraction by a monopolist.

Readings: Hartwick and Olewiler, chapter 8, and ch. 9 : pp
Banks, chapter 9 : pp

3. The World Oil Market

The reserve-production ratio and applications; world oil reserves, demand and supply; OPEC; supply disruptions and energy crisis; the cartel problem; oil and national security problem; introduction to oil futures market.

Readings: Banks, chapter 3
Tietenberg, chapter 8: pp

4. An Introduction to Economics of Natural Gas

Background and terminology; natural gas transportation and trade; three aspects of natural gas economics: production, transmission, and storage; regulation and deregulation; marginal costs and peak-load pricing.

Reading: Banks, chapter 4

5. Coal Industry

Coal supply and demand; environmental consequences of using coal; application of some game theory concepts to pollution abatement problems; application of transportation economics to coal industry.

Reading: Banks, chapter 5

6. Electricity Economics

Introductory remarks: calculation of capital cost per kw per year, load factor, capacity factor, optimal plant mix, daily load curve and load duration curve; the economics of load division; pricing issues; regulation and deregulation; Averch-Johnson Effect.
Reading: Banks, chapter 7

7. Nuclear Energy and Safety

Some nuclear background: uranium fuel, technology, and the basic principle (fission); government activities; the economics of nuclear energy: the operating record, costs of nuclear generation; safety and non-monetary aspects of nuclear power.
Banks: chapter 8: pp
Other source(s):

8. Externalities and Pollution

Externalities and market failure; introduction to economics of pollution; government policies; the theory of environmental controls; cost–benefit analysis of improving environmental quality.
Readings: Hartwick and olewiler, chapter 8, chapter 9: pp

9. Energy Derivatives: Futures, options and swaps

Mechanics of futures markets; hedging and speculation; oil futures markets; call and put options and oil options pricing; oil swaps.
Banks, chapter 6

* 10. Natural resource scarcity and sustainability

Readings: Hartwick and Olewiler, chapter 2, 12.

*. The topics indicated with a star (*) and other topics will be covered if time permits.
Note: Changes in the syllabus are likely.