UNIVERSITY OF COLORADO, SPRING 2001

NATURAL RESOURCE ECONOMICS, Econ 3535-001

(Course for Non-Economics Major Students)

Class Hours: MWF 1:00 p.m. to 1:50 p.m. @ Hlms 252

Instructor: Vijaya R. Sharma, Ph.D.

Office: Econ 4A; Office Hours: MWF 2:00 p.m. to 3:00 p.m.

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Course Introduction

This course presents theories of efficient utilization of natural resources and discusses issues related to current practices of use of resources. It also discusses issues of sustainability, conservation, and preservation. The course extensively uses graphical analyses and requires students a number of readings. An introductory course (Econ 1000) or a course on principles of microeconomics (Econ 2010) is a prerequisite.

Textbook and Readings

2. Prescribed Readings (see the course outline below)
3. Web notes in the web site: http://spot.colorado.edu/~sharmav/

Examinations and Grading

The course is divided in four sections and each section would be followed by an exam. The course grade would be based on performance in four exams (90%) and on fulfillment of assigned readings (10%). Students will submit one or two page summary of each assigned reading on its due date. Exam dates are:

Exam 1 on February 12, Monday
Exam 2 on March 12, Monday
Exam 3 on April 16, Monday
Exam 4 on May 8, Tuesday, 130 p.m.- 400 p.m.

No makeup examination shall be given. Of the first three exams, the exam with the lowest score would be dropped for calculation of the course grade. If you miss any one of the first three exams for any reason, that would be the one dropped. You cannot drop Exam 4 or more than one exam. For full credit, summary of each prescribed reading has to be turned in on its due date. You can get one-half credit with late submissions of readings under each section of the course if you turn them in at the latest on or before the exam for that section. No further late submission would be accepted.

Course Outline and Tentative Schedule

Section I: Introduction and Basic Economic Concepts

1. Course Introduction (Jan 17, Chapter 1 and Web Notes 1)

Syllabus and Grading Policy

Types of Resources (Resource Flows, Natural Resources, Environmental Resources)
Reasons of Studying Natural Resource Economics (Dynamic decisions, pervasive market failure, potential irreversible consequences, multidisciplinary knowledge)

Broad Issues (Efficiency, Sustainability, Resource Scarcity and Economic Growth)

2. Economics Approach and Rule of Economizing Behavior (Jan 19, Chapter 2 and Web Notes 1)
   Economics Approach and Anthropocentricity
   Rule of Economizing Behavior and Examples
   Importance of Marginal Analysis

3. Demand, Supply, and Competitive Market (Jan 24, 26, Chapter 2 and Web Notes 1)
   Demand curve, Marginal Willingness to pay, Declining MB, Consumer Surplus
   Supply, Increasing Marginal Cost of Production, Producer Surplus
   Market Outcomes, Efficiency
   Government Interventions Affecting Efficient Outcomes

4. Market Failure Cases and Role of Government (Jan 29, 31, Chapter 4 and Web Notes 1)
   Divergence of Private and Social Interest
   Imperfect Competition

5. Possibility of Government Failure (Feb 2, 5, Chapter 4 and Web Notes 1)
   Characteristics of Public Policy Decision Process (Rational voter ignorance, short sightedness, special interest effects, and rent seeking)

6. Types of Resources and Economic Rent of Resources (Feb 7, Chapter 7 and Web Notes 1)
   Non-Renewable Resources and Renewable Resources
   Economic rent of natural resources, its relation to scarcity

7. Types of Reserves and Indicators of Physical Scarcity (Feb 9, Chapter 7 and Web Notes 1)
   Current Reserves, Potential Reserves, Resource Endowment, Price and Size of Reserves, Indicators of Physical Scarcity (static reserve index and exponential reserve index)

Exam 1 on Section I on February 12, Monday

Section II: Economics of Non-Renewable Resources

1. Dynamic Decision Rule (Feb 14, 16, Chapter 7, Web Notes 2, and pages 48-49 of the textbook)
   Concept of Discounting, Present value formula, Choice of discount rate

http://www.colorado.edu/Economics/spring01-syllabi/spring01-3535-001syllabus.htm 12/28/00
Two-Period Dynamic Decision Rule and Comparison with Static Economizing Behavior Rule

Marginal User Cost and Rent

Multi-Period Decision Rule

Efficiency vs. Sustainability

2. Efficient Extraction of Exhaustible Resources (Feb 19, 21, 23, 26, 28; Chapter 7 and also Natural Gas Price Controls in Chapter 8, and Web Notes 2)

Hotelling Rule: Mathematical and Graphical Explanations

Asset Market, Flow Market, Equilibrium Conditions

Best Reserve First

Path of efficient prices and scarcity rent under Zero MEC, Constant MEC, Increasing MEC

Impacts of changes in discount rate, price of substitute, stock, MEC, and demand

Extraction under Monopoly, Negative externality

Effects of Price Ceiling (Historical Regulation of Natural Gas Prices)

Myopic Behavior of Flow Market and Role of Asset Market

Role of Government

3. Reading #1 due on March 2: The New Economics of Oil, by Peter Coy, Gary McWilliams, and John Rossant, from the Business Week, November 3, 1997, pp. 140-146 (Mar 2, 5)

Conventional scenario vs. Alternative Scenario of Energy Prices

Implications of Alternative Scenario on pollution and scarcity of oil

Hotelling Principle and Actual Price Trend

National Security Issue and Vulnerability Premium


Implications of recycling to stock, exhaustion, and price of virgin resource

Economics of recycling (demand, quality, and cost)

Exam 2 on Section II on March 12, Monday (deadline for late submission of readings #1 and 2)

Section III: Economics of Renewable Resources

1. General Characteristics and Problems (Mar 14)
Renewable but depletable, Regeneration a function of stock or time, Open access, Nonmarket and Public Goods Services, Ecological Complexities

2. Efficient Allocation of Water (Mar 14, 16, 19, Chapter 9 and Web Notes 3)
   Safe Yield Use Principle of Ground Water, Use of ground water as an exhaustible resource
   Equimarginal Principle of Allocation of Surface Water

3. Optimal Timber Harvesting Rules (Mar 21, 23, April 2, Chapter 11 and Web Notes 3)
   MAI rule of harvesting, Single Harvesting, Optimum Rotation

4. Sustainable Fishery Harvesting Rules (April 4, 6, 9, Chapter 12 and Web Notes 3)
   Static Model, Dynamic Model

5. Factors Contributing to Inefficient Utilization (April 11, 13, relevant sections of Chapters 9, 11, and 12 and Web Notes 3)
   Problems of water rights transfer, and price subsidy and conservation of water and forestry, Problems with multiple use of forests, Divergence in discount rate, Economies of scale, pollution and impact on forestry, perverse incentives

Reading # 3 due on April 11: Is Water Different?, by R. Miller, D. Benjamin, and D. North, from The Economics of Public Issues, by the same authors, 10th edition, 1996, pp. 37-41

Reading # 4 due on April 11: Free Market Forestry, by Mark Muro, from the Denver Rocky Mountain News, Sunday, June 1, 1997, pp. 1B

Open access problems with forestry and fishery, possibility of species extinction

Reading #5 due on April 13: Conservation through Commerce, by Ike Sugg, from the Denver Rocky Mountain News, Sunday, July 28, 1997, pp. 1B

Reading #6 due on April 13: Bye, Bye, Bison, by R. Miller, D. Benjamin, and D. North, from the Economics of Public Issues, by the same authors, 10th edition, 1996, pp. 164-170

Exam 3 on Section III on April 16, Monday (deadline for late submission of readings #3,4,5, and 6)

Section IV: Trends of Resource Scarcity, Sustainability, Conservation, and Preservation

1. Resource Scarcity and Economic Growth (Apr 18, 20, Chapter 1, Example 18.5 in page 379 of the textbook, and Web Notes 4)
   Pessimist vs. Optimist Models
   Factors Mitigating Scarcity

2. Nonuse Values of Resources and Protection of Biodiversity (Apr 23, 25)
   Definition and Components of Total Economic Value
Biodiversity and Endangered Species

Reading #7 due on April 23: Economic Assessment of Biodiversity and Protected Species, from Environmental Economics, Theory, Application, and Policy, by Duane Chapman, Addison Wesley Longman, 2000, pp. 273-281

3. Sustainability, Conservation, and Preservation (Apr 27,30, May 2,4, initial sections of Chapter 18 and Web Notes 4)

John Rau'ls sustainability principle as nondeclining welfare

Solow-Hartwick sustainability rule of nondeclining capital


Issue of Substitutability of Natural Capital with Manmade Capital, Assymetry of Technological Progress, Changing Preferences in Favor of Natural Resources, Irreversibility, Sustainability as nondeclining flow of physical services of natural resources, Safe Minimum Standard of Use, Preservation, and Conservation


Weak Measure of Sustainable Development, Strong Measure of Sustainable Development, Empirical Findings on Sustainable Development in Selected Countries


Exam 4: May 8, Tuesday, 130 p.m. - 400 p.m. (deadline for late submission of readings #7,8,9, and 10)

Accommodations for Students with Documented Disability

The Economics Department will make reasonable accommodations for persons with documented disabilities. Students must notify the instructor within a week of the beginning of the class and provide documentation of the disability obtained from the Disabilities Services Office located in Willard Hall, Room 322.