

Nicholas School of the Environment and Earth Sciences  
Duke University  
Lori Snyder Bennear  
Fall 2006

**Syllabus**  
**ENV-270 Resource and Environmental Economics**  
T/Th 10:05-11:20  
Love Auditorium

*Nature and Purpose of the Course*

This course provides a survey of environmental and natural resource economics. The course covers conceptual and methodological topics and applies these skills to current issues in environmental and resource policy. The course is roughly divided in thirds. The first third of the course focuses on basic theory and methods of economic analysis of environmental problems. What is the efficient level of environmental protection? How does cost-benefit analysis help determine efficient policies? How is cost-benefit analysis implemented? The second third of the course focuses on the economics of the environment, particularly the economics of pollution control. We will evaluate several different methods for pollution control from an economic perspective. The final third of the course focuses on natural resource management. What is the optimal rate of extraction of oil? What is the optimal fishery or forest management policy? What policy instruments can be used to attain these optimal management levels?

*Instructors*

Faculty:	Lori Bennear A125 LSRC 613-8083 lori.bennear@duke.edu Office Hours: Tuesday's and Friday's 1:30-3:00 p.m.
Teaching Assistants:	Madeleine Baker madeleine.baker@duke.edu  Zachary Brown zachary.brown@duke.edu
Graders:	Christopher Clatterbuck chris.clatterbuck@duke.edu  Yoanna Kraus yoanna.kraus@duke.edu

***Prerequisites:***

Students are required to have taken an introductory microeconomics course such as Economics-51D. Students should be familiar with basic microeconomic concepts such as: supply and demand functions, consumer and producer surplus and deadweight loss, opportunity cost, marginal analysis, and time discounting. If you need a refresher I highly recommend the following text:

Mankiw, N. Gregory *Principles of Microeconomics* (Fort Worth, TX: Harcourt College Publishers).

There is a new edition of this book nearly every year. Any edition will suit your purposes, so I encourage you to buy used and save some money.

***Required Readings:***

There are two required books for the course—one textbook and one volume of selected readings. Throughout the syllabus these readings will be abbreviated as TEXT and EOE.

TEXT: Tietenberg, Tom. *Environmental and Natural Resource Economics*, Sixth Edition. (Boston: Addison Wesley, Inc., 2003).

EOE: Stavins, Robert N., ed. *Economics of the Environment: Selected Readings*, Fifth Edition. (New York, NY: W.W. Norton & Company, 2000).

In addition, there are several articles or handouts that will be available either through E-Reserves or on Blackboard. These articles are marked with an asterisk (\*).

***Course Requirements and Grading:***

Problem Sets	25%
Midterm	30%
Final	45%

## Nicholas School Honor Code

All activities of Nicholas School students, including those in this course, are governed by the Duke Community Standard:

### The Duke Community Standard

Duke University is a community of scholars and learners, committed to the principles of honesty, trustworthiness, fairness, and respect for others. Students share with faculty and staff the responsibility for promoting a climate of integrity. As citizens of this community, students are expected to adhere to these fundamental values at all times, in both their academic and non-academic endeavors.

#### The Pledge

Students affirm their commitment to uphold the values of the Duke University community by signing a pledge that states:

1. I will not lie, cheat, or steal in my academic endeavors, nor will I accept the actions of those who do.
2. I will conduct myself responsibly and honorably in all my activities as a Duke student.

### Study Groups

You will be assigned to a study group based on your responses to the questionnaire distributed on the first day of class. If did not attend the first day of class, please see one of the teaching assistants to be assigned to a study group. Groups are designed to have a mix of students with different math and economics backgrounds. You are strongly encouraged, to work in your assigned study groups on problem sets.

### Problem Sets

There will be five problem sets. The problem sets will be quantitative in nature involving algebra, calculus, and using Excel to do more complicated calculations. I encourage you to work in your study groups on these problem sets and help each other learn. However, each student **must submit his or her own copy of the assignment and you are not allowed to directly copy another student's work.**

An example of appropriate problem set collaboration would be for Student A to explain the calculus used in the problem to Student B. Then Student B goes off on his own and completes the problem again and writes up his own explanation. It would be inappropriate for Student B to directly copy the math or the explanation/interpretation directly from Student A.

In my experience, study groups are most effective when everyone attempts to do the problem sets BEFORE meeting as a group. Only if you really try to solve the problem on your own will you realize whether you understand the problem and its solution. It is very

easy to hear someone's explanation and think you understand the problem, but on the exams you will not have the benefit of your study group so get in the habit of completing the first round of the problem sets on your own. This will also help insure that you are using the study group in ways that are consistent with the Nicholas School Honor Code.

### **Exams**

The **midterm** is an hour and half exam that will take place during class on October 5<sup>th</sup>.

The **final** is a three-hour exam that will take place on Monday, December 11<sup>th</sup> from 7-10 p.m. This exam will not be self-scheduled and we must use the finals schedule provided by the registrar's office. There will no exceptions. Do not buy plane tickets, sign up for field trip classes, etc that require you to leave Durham before the 12<sup>th</sup>.

## Outline of the Course

- I. Introduction to Environmental Economics
  - a. Microeconomics
  - b. Economic Efficiency and Cost-Benefit Analysis
  - c. Mechanics of Cost-Benefit Analysis
    - i. Benefit Estimation
    - ii. Cost Estimation
- II. Economics of the Environment
  - a. Pollution Control and Instrument Choice
  - b. Advanced Topics in Instrument Choice
    - i. Uncertainty
    - ii. General Equilibrium Effects
  - c. Application to Climate Change
- III. Economics of Natural Resources
  - a. Non-renewable Resources – Oil and Minerals
  - b. Renewable Resources
    - i. Common-Property Resources – Fisheries
    - ii. Storable Renewable Resources – Forests
    - iii. Replenishable but Depletable Resources – Water Allocation
  - c. Biodiversity
- IV. Environmental Macroeconomics
  - a. Sustainability
  - b. Trade and the Environment

**August 29<sup>th</sup>: Environmental Economics Overview I**

TEXT: Chapter 1 – Visions of the Future, pp. 1-15

EOE: Chapter 1 – Fullerton and Stavins, “How Economics See the Environment,” Nature, 1988.

**August 30<sup>th</sup>: Optional Calculus Review Session**

**August 31<sup>st</sup>: Environmental Economics Overview II**

**Sept 1<sup>st</sup>: Optional Microeconomics Review Session**

Optional: Chapters 4 and 6 in N. Gregory Mankiw “Principles of Microeconomics” (Fort Worth, TX: Harcourt College Publishers).

**Sept 5<sup>th</sup>: Market Failures – the basis for Environmental Economics**

TEXT: Chapter 4 – Property Rights, Externalities, and Environmental Problems

Optional: Chapters 10 and 11 in N. Gregory Mankiw “Principles of Microeconomics” (Fort Worth, TX: Harcourt College Publishers).

**Sept 7<sup>th</sup>: Static Efficiency**

TEST: Chapter 2 – Valuing the Environment: Concepts

EOE: Chapter 12 – Arrow, et al., “Is There a Role for Benefit-Cost Analysis in Environmental, Health and Safety Regulation?” Science, 1996.

EOE: Chapter 14 – Kelman “Cost-Benefit Analysis: An Ethical Critique.” Regulation, 1981 with replies by DeLong, Solow, Butters, Calfee, and Ippolito.

**Sept 12<sup>th</sup>: Dynamic Efficiency**

PROBLEM SET #1 DISTRIBUTED IN CLASS

\* Chapter 6 of Guidelines for Preparing Economic Analyses (Washington, D.C.: U.S. Environmental Protection Agency, 2000)

**Sept 14<sup>th</sup>: Benefits Estimation – Revealed Preference**

TEXT: Chapter 3 – Valuing the Environment: Methods

\* Chapter 7 of Guidelines for Preparing Economic Analyses (Washington, D.C.: U.S. Environmental Protection Agency, 2000)

**Sept 19<sup>th</sup>: Benefits Estimation – Stated Preference**

EOE: Chapter 7 – Portney “The Contingent Valuation Debate: Why Economists Should Care,” *Journal of Economic Perspectives*, 1994.

EOE: Chapter 8 – Hanemann, “Valuing the Environment through Contingent Valuation,” *Journal of Economic Perspectives*, 1994.

EOE: Chapter 9 – Diamond and Hausman, “Contingent Valuation: Is Some Number Better than No Number?” *Journal of Economic Perspectives*

EOE: Chapter 10 – Carson, et al., “Contingent Valuation and Lost Passive Use: Damages from the Exxon Valdez Oil Spill,” *Environmental and Resource Economics*

**Sept 21<sup>nd</sup>: Benefits Estimation – Valuing Morbidity and Mortality**

PROBLEM SET #1 DUE IN CLASS

PROBLEM SET #2 DISTRIBUTED IN CLASS

EOE Chapter 11-- Viscusi, “The Value of Life in Legal Contexts: Survey and Critique,” *American Law and Economics Review*.

**Sept 26<sup>th</sup>: Cost Estimation**

\* Chapter 8 of Guidelines for Preparing Economic Analyses (Washington, D.C.: U.S. Environmental Protection Agency, 2000)

EOE: Chapter 4 – Jaffe, et al., (1995) “Environmental Regulation and the Competitiveness of U.S. Manufacturing: What Does the Evidence Tell Us?” *Journal of Economic Literature*, 33:132-63.

EOE: Chapter 5 – Porter and van der Linde (1995) “Toward a New Conception of the Environment-Competitiveness Relationship,” *Journal of Economic Perspectives*, 9(4): 97-118.

EOE: Chapter 6 – Palmer, Oates and Portney (1995) “Tightening Environmental Standards: The Benefit-Cost of the No-Cost Paradigm?” *Journal of Economic Perspectives*, 9(4): 119-32.

**Sept 28<sup>th</sup>: Economics of Pollution Control – Cost Effectiveness**

PROBLEM SET #2 DUE IN CLASS

TEXT: Chapter 15 – Economics of Pollution Control

EOE Chapter 15: Tietenberg, "Economic Instruments for Environmental Regulation," Oxford Review of Economic Policy, 1990.

**Oct 3rd: Economics of Pollution Control – Taxes and Permit Systems**

EOE Chapter 17 – Stavins "What Can We Learn from the Grand Policy Experiment"  
Journal of Economic Perspectives

EOE: Chapters 18 – Sandel, "It's Immoral to Buy the Right to Pollution," New York Times, 1997 and replies by Shavell, Stavins, Gaines, and Maskin.

**Oct 5<sup>h</sup>: MIDTERM EXAM**

**Oct 10<sup>th</sup>: Fall Break**

**Oct 12<sup>th</sup>: Economics of Pollution Control – Instrument Choice Under Uncertainty**

PROBLEM SET #3 DISTRIBUTED IN CLASS

Optional: Weitzman, Martin (1994) "Prices vs. Quantities," Review of Economic Studies, 41(4): 477-91.

**Oct 17<sup>th</sup>: Economics of Pollution Control – Instrument Choice in Second-Best Setting**

EOE: Chapter 16 – Goulder "Environmental Policy Making in a Second-Best Setting"

**Oct 19<sup>th</sup>: Application – Climate Change I**

TEXT: Chapter 17 – Regional and Global Air Pollutants

EOE: Chapters 22-25

**Oct 24<sup>th</sup>: Application – Climate Change II**

PROBLEM SET #3 DUE IN CLASS

**Oct 26<sup>th</sup>: NO CLASS TODAY**

**Oct 31<sup>st</sup>: Introduction to Dynamic Problems**

**Nov 2<sup>nd</sup>: Optimal Extraction of Non-Renewable Resources (1)**

TEXT: Chapter 7 – The Allocation of Depletable and Renewable Resources

**Nov 7<sup>th</sup>: Optimal Extraction of Non-Renewable Resources (2)**

PROBLEM SET #4 DISTRIBUTED IN CLASS

**Nov 9<sup>th</sup>: Renewable Resources – Fisheries (1)**

EOE: Chapter 2 – Hardin (1968) “The Tragedy of the Commons,” *Science* 162: 1243-48.

TEXT: Chapter 13 – Renewable Common-Property Resources: Fisheries and Other Species

**Nov 14<sup>th</sup>: Renewable Resources – Fisheries (2)**

**Nov 16<sup>st</sup>: Renewable Resources – Forests**

PROBLEM SET #4 DUE IN CLASS

PROBLEM SET #5 DISTRIBUTED

TEXT: Chapter 12 – Storable, Renewable Resources: Forests

**Nov 21<sup>st</sup>: Biodiversity**

EOE: Chapter 28 – Metrick and Weitzman (1998) “Conflicts and Choices in Biodiversity Preservation,” *Journal of Economic Perspectives*, 12(3): 21-34.

\*Weitzman, Martin (1993) “What to Preserve? An Application of Diversity Theory to Crane Conservation,” *The Quarterly Journal of Economics*, 108(1): 157-183.

**Nov 28<sup>th</sup>: Sustainability – The Economic Perspective**

EOE: Chapter 26 – Solow “Sustainability: An Economist’s Perspective”

**Nov 30<sup>th</sup>: Trade and the Environment**

EOE Chapters 19-21.

PROBLEM SET #5 DUE IN CLASS