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
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Office Hours: Tuesday’s and Friday’s 1:30-3:00 p.m.

Teaching Assistants: Madeleine Baker
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Graders: Christopher Clatterbuck
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Yoanna Kraus
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**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.


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:**

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<thead>
<tr>
<th>Task</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Problem Sets</td>
<td>25%</td>
</tr>
<tr>
<td>Midterm</td>
<td>30%</td>
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<tr>
<td>Final</td>
<td>45%</td>
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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 5th.

The **final** is a three-hour exam that will take place on Monday, December 11th 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 12th.
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 29th: Environmental Economics Overview I

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


August 30th: Optional Calculus Review Session

August 31st: Environmental Economics Overview II

Sept 1st: Optional Microeconomics Review Session

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

Sept 5th: 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 7th: Static Efficiency

TEST: Chapter 2—Valuing the Environment: Concepts


Sept 12th: Dynamic Efficiency

PROBLEM SET #1 DISTRIBUTED IN CLASS


Sept 14th: Benefits Estimation—Revealed Preference

TEXT: Chapter 3—Valuing the Environment: Methods
Sept 19th: Benefits Estimation—Stated Preference


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


Sept 21st: Benefits Estimation—Valuing Morbidity and Mortality

PROBLEM SET #1 DUE IN CLASS
PROBLEM SET #2 DISTRIBUTED IN CLASS


Sept 26th: Cost Estimation


Sept 28th: Economics of Pollution Control—Cost Effectiveness

PROBLEM SET #2 DUE IN CLASS

TEXT: Chapter 15—Economics of Pollution Control

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


Oct 5th: MIDTERM EXAM

Oct 10th: Fall Break

Oct 12th: Economics of Pollution Control—Instrument Choice Under Uncertainty

PROBLEM SET #3 DISTRIBUTED IN CLASS


Oct 17th: Economics of Pollution Control—Instrument Choice in Second-Best Setting

EOE: Chapter 16—Goulder “Environmental Policy Making in a Second-Best Setting”

Oct 19th: Application—Climate Change I

TEXT: Chapter 17—Regional and Global Air Pollutants

EOE: Chapters 22-25

Oct 24th: Application—Climate Change II

PROBLEM SET #3 DUE IN CLASS

Oct 26th: NO CLASS TODAY

Oct 31st: Introduction to Dynamic Problems

Nov 2nd: Optimal Extraction of Non-Renewable Resources (1)

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

Nov 7th: Optimal Extraction of Non-Renewable Resources (2)
PROBLEM SET #4 DISTRIBUTED IN CLASS

Nov 9th: Renewable Resources—Fisheries (1)


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

Nov 14th: Renewable Resources—Fisheries (2)

Nov 16th: Renewable Resources—Forests

PROBLEM SET #4 DUE IN CLASS
PROBLEM SET #5 DISTRIBUTED

TEXT: Chapter 12—Storable, Renewable Resources: Forests

Nov 21st: Biodiversity


Nov 28th: Sustainability—The Economic Perspective

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

Nov 30th: Trade and the Environment

EOE Chapters 19-21.

PROBLEM SET #5 DUE IN CLASS