

**Georgia Institute of Technology  
Ivan Allen College of Liberal Arts  
School of Economics**

**Economics 4440/6380  
Economics of the Environment  
Spring 2016**

**Meeting Time and Location:** MWF 11:05-11:55 a.m., 270 Skiles Classroom Building

**Instructor:** Dr. Matthew E. Oliver, Assistant Professor

**Office:** 223 Old CE Building

**Office Hours:** MW, 1:30-3:00 p.m., or by appointment

**E-Mail:** [matthew.oliver@econ.gatech.edu](mailto:matthew.oliver@econ.gatech.edu)

**Office Phone:** 404-894-0941

**Course Description:** Environmental issues are becoming increasingly central in our lives. As the world population and its associated consumption grows, there are more and more people taking natural resources such as fossil fuels, minerals, timber, and fishes from the environment. At the same time, they are adding to the environment wastes such as air and water pollution, acid rain, toxins, and gases that are altering the earth's climate. What will the future hold for us, and can anything be done? To answer these questions, we need a coherent framework of analysis, and economics provides one framework. Environmental economics, in particular, provides the framework for examining the interaction between economic systems and environmental systems. Similarly, natural resource economics analyzes the efficient allocation of natural resources both across users and over time. We will see that although market systems are well suited for producing and allocating many of the goods used in modern societies, these markets are not well suited for allocating 'non-market' goods such as clean air and water, pristine forests, or biodiversity, nor are they effective in limiting the 'bads', i.e. the harmful wastes flowing into the environment. Environmental and natural resource economics addresses how markets can be altered, regulated, or even created, usually through necessary government actions, so that a more socially optimal allocation of goods and bads can be achieved.

**Course Objective:** To introduce students with a basic understanding of microeconomics and to the public policy methods and tools used to address environmental economic problems.

**Course Prerequisites:** Intermediate Microeconomics

**Required Text:** Tietenberg and Lewis, *Environmental and Natural Resource Economics*, 10<sup>th</sup> ed., 2014, Pearson.

**Supplementary Texts:** Other texts that I will use to help us explore different topics, but that you are *not* required to purchase:

- *Economics of the Environment: Selected Readings*, Edited by Robert N. Stavins (2012), 6<sup>th</sup> ed., W.W. Norton & Company, Inc., N.Y.
- *Environmental Economics in Theory and Practice*, by Nick Hanley, Jason F. Shogren, and Ben White, 2<sup>nd</sup> Ed., Palgrave MacMillan, N.Y.

- *The Economics of Natural Resource Use*, by John M. Hartwick and Nancy D. Olewiler (1998), 2<sup>nd</sup> ed., Harper Collins Publishers, Inc., N.Y.
- *Resource Economics*, by Jon M. Conrad (1999), Cambridge University Press, N.Y.

**Grading and Course Requirements:** As much of the course material will be exceedingly subjective, the manner in which I will grade your performance will be subjective as well. Be aware that effort, attentiveness, attendance, and communication will go a long way in terms of influencing that subjectivity. However, given that we must have some sort of statistical methodology for assigning grades, the grading scale for this course is as follows:

85%-100%	A
70%-85%	B
55%-70%	C
< 55%	D

Your grade for this course will comprise four components:

1. *Homeworks* (25%) – I anticipate 5-6 homework assignments, depending on the speed of our progress through the material.
2. *Exams* (50%) – We will have one mid-term and a final exam, each of which is equally weighted (25% each). For each exam, I will give you four candidate questions in advance. On exam day, a randomization device will determine which two questions you will be required to answer.
3. *Group Research Paper* (25%) – For more information, please see the **Group Research Paper Guidelines** document, which is available on the t-square course site.

So, for example, let's say at the end of the semester your homework average is a 85, you made an 80 on the mid-term exam and a 75 on the final exam, and you got a 95 on the group research paper. Your grade for the course would be:

$$0.25(85) + 0.25(80) + 0.25(75) + 0.25(95) = 83.75 \rightarrow B$$

**Attendance & Other Course Policies:** You are required to attend class. However, to make things more interesting, I will implement a class attendance game. For more information, please see the **Attendance Game** document, which is available on the t-square course site.

**Other Course Policies:** Please set cell phones to 'silent', and *do not* answer your phone while in class (do not get up and leave the classroom to answer your phone either). If it is a genuine emergency, you will be permitted to exit the classroom to address the issue. Texting during class is not permitted. You may bring your laptop computer or other device to class, but only if you are using it for course-related activities (not for playing games or looking at Facebook, among other things). The dates for the mid-term exam and the seminar presentations will be jointly decided by the class early in the semester, after which they are non-negotiable. The date and time of the final exam will be in accordance with the Institute's final exam schedule, and is non-negotiable. However, if you become gravely ill or some other misfortune befalls you such that you acquire an Institute-approved excusal from an exam, you will be permitted to reschedule.

**Academic Dishonesty:** Cheating and plagiarism will not be tolerated. Any violation of the Institute's Honor Code will be reported to the Dean of Students.

**Group Work Guidelines:** You are encouraged to interact with other students outside the classroom to discuss the homework and candidate exam questions. For the formal group project assignment, see the **Group Project Guidelines** document.

**Disclaimer:** If anything significant should change with respect to this syllabus, I will let you know immediately.

**Course Outline** (subject to change):

## **0. Review of Key Economic Concepts**

Review of Microeconomics

- Supply, Demand, & The Equilibrium Concept
- Consumer & Producer Surplus
- Constrained utility and profit maximization using the Lagrangian method

## **I. Introduction to Environmental Economics**

Chapter 1: Visions of the Future

- Introduction
- The Malthusian Trap
- Core Environmental Issues

Chapter 2: The Economic Approach (Introduction to Key Concepts)

- The Environment as an Asset
- Economic Efficiency and Market Failure
- Property Rights
- Externalities
- Open-Access Resources
- Public Goods

Chapter 4: Valuing the Environment

- Stated Preference vs. Revealed Preference
- Travel Cost Method
- Hedonic Valuation

## **II. Natural Resource Economics**

Chapter 6: Depletable Resources

- Taxonomy of Depletable Resources
- Marginal User Cost
- Backstop Resources
- Theory of the Mine

Chapter 7: Energy

- Energy Regulation
- Tradable Permits
- OPEC
- Shale Oil & Gas
- Other Energy Resources: Nuclear, Wind, & Solar

Chapter 9: Water

- Key Issues
- The Hydrological Cycle vs. the Hydro-Social Cycle
- Efficient Allocation of Surface Water
- Efficient Allocation of Groundwater
- Water Demand & Water Pricing

Chapters 12 & 13: Renewable Resources (Forests & Fisheries)

- Forestry Economics & the Optimal Rotation Length
- The Economics of Fisheries & The Open Access Problem

### **III. Issues in Environmental Economics**

Risk and the Environment<sup>1</sup>

- Defining Risk and Uncertainty
- Introduction to Expected Utility Theory
- Valuing Risk Reduction
- The Precautionary Principle
- Expected Utility Theory – Revisited

Chapters 5 & 20: Sustainable Development

- Dynamic Efficiency & Intergenerational Equity
- “Weak” Sustainability vs. “Strong” Sustainability
- The Hartwick Rules
- Common & Perrings Strong Sustainability Rules
- Inter-temporal Altruism

---

<sup>1</sup> This topic is not covered in the Tietenberg & Lewis text.