

UNIVERSITY OF OREGON

Environmental Studies

W'09

**Preliminary Syllabus, Version 2.2**

ENVS 399 – Allocating Scarce Environmental Resources

Lectures: M,W 2:00-3:50 pm, 105 ESL (capacity: 60) CRN: 22037 Credits: 4  
Grading options: graded for Majors; optional for all other students

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**Brief Course Description:**

Considerations for the design of environmental and natural resources policies and regulations: balancing society's preferences and the costs of environmental protection and resource conservation.

**Expanded Course Description:**

Earth does not have enough resources to permit humans to have as much of everything as they might want. We are the dominant species; other species currently have standing only insofar as humans care about them. In this capacity, we must often make difficult choices about how the earth's environmental and natural resources are managed. For example, forests can be preserved in their natural state, harvested selectively and sustainably, clear-cut, or turned into farms, housing developments or shopping malls. Lax pollution regulations can permit industry to prosper, allowing higher wages, lower consumer prices and bigger investment returns for people who are saving for their retirements, or pollution can be tightly controlled to improve human health outcomes and protect ecological systems and their services.

Different constituencies have different levels of desire for each of the range of possible management outcomes. The benefits or costs to individual humans under different management scenarios may be modest but widespread, or they may be large and concentrated among fewer people. The benefits may also accrue to very different groups of people than those who bear the costs. There are often benefits and costs from the way resources are managed that spill over onto third parties—who are not directly involved in the decisions that have been made and who therefore do not have any weight given to their preferences in these choices. Likewise, many resources belong to everyone but no one, and sustainable management is often fundamentally impossible without government intervention in the form of policies and regulations.

We will explore how environmental and natural resource management decisions are made. Given that we need to use at least some natural resources to survive, it is not possible to completely eliminate all mining, fishing, or logging. Likewise, it is not possible to reduce all forms of pollution to zero. But how much of each of these activities is too much? We will examine some pragmatic criteria and some evidence which can be used to help guide decision-makers who are responsible for setting policies and regulations. We will pay particular attention to circumstances when government intervention is essential because private incentives definitely cannot be relied upon to yield socially desirable outcomes.

### **Position in the UO Curriculum:**

Environmental Studies majors sometimes have little prior exposure to the principles behind incentive-based strategies for environmental management via government policies and regulations. The academic discipline of economics concerns the allocation of scarce resources among competing uses. But many people with little or no exposure to the discipline tend to confuse economists with some of the behaviors that they study. Environmentalists often do not distinguish between economists and the owners or managers of profit-maximizing corporations who ignore environmental damages because they only care about the “bottom line.” This is like rejecting the field of criminology because you are opposed to crime.

A basic familiarity with economics is crucial to an understanding of environmental and natural resource policies. However, introductory courses in economics rarely spend more than one or two lectures on applications to the environment or natural resources, and they are designed primarily to equip students with all of the analytical tools needed to continue in the economics major. While EC 333 (Resource and Environmental Economic Issues) is offered at least once each year at the University of Oregon, EC 333 has EC 201 (Introduction to Economic Analysis: Microeconomics) as a prerequisite, and it is taught at a more analytically rigorous level. This course (ENVS 399) is targeted specifically to ENVS majors and covers only the most-relevant material from EC 201 and a portion of the more-accessible material from EC 333, supplemented with policy-related readings and references to current events. This course is intended to function as “just enough economics” for the ENVS undergraduate major. It is not a substitute for EC 201.

### **Necessary skills:**

The course will require no algebra or calculus. However, a rudimentary understanding of simple graphs and how they can be used to describe how one thing depends on another will be important. For a graph that shows the relationship between  $y$  on the vertical axis and  $x$  on the horizontal axis, participants will need to be comfortable with the idea that slope = rise/run = the change in  $y$  for a one-unit change in  $x$ .

### **Textbooks/Readings:**

There is no single textbook for this course, although we will draw two or more chapters from each of the following books. None of these books has been explicitly ordered as a text, although a course reader is being assembled which will make available copies of the relevant sections (at a price which includes the necessary copyright clearance fees).

- Field, Barry C. (2008) *Natural Resource Economics: An Introduction*, 2<sup>nd</sup> edition, Long Grove, Illinois: Waveland Press.
- Field, Barry C. and Martha K. Field (2009) *Environmental Economics: An Introduction*, 2<sup>nd</sup> edition, New York: Irwin/McGraw-Hill
- Goodstein, Eban (2005) *Economics and the Environment*,” 4<sup>th</sup> edition, John Wiley & Sons
- Oates, Wallace E., (ed) (2006) *The RFF Reader in Environmental and Resource Policy*, 2<sup>nd</sup> edition, Washington, DC: RFF Press.
- Stavins, Robert N (ed.) (2005) *Economics of the Environment: Selected Readings*, 5<sup>th</sup> edition, New York: W.W. Norton and Company [EESR]
- Champ, Patricia A., Kevin J. Boyle, and Thomas C. Brown (eds) (2003) *A Primer on Nonmarket Valuation*, Dordrecht, Netherlands: Kluwer Academic Publishers.

The links associated with author names in the reading list below should take you directly to UO’s digital subscriptions for the corresponding journal articles. You will need to go through the “Authentication for Library Electronic Resources” to access these materials. This typically requires you to enter your name (corresponding to official UO records) and your 9-digit UO ID. Selected newspaper clippings on relevant current events will be also archived only for the duration of the course on a password-protected server. Relevant items for specific lecture topics will be drawn to your attention as we go along.

Required readings will be targeted to average roughly 60 pages per week of relatively straightforward prose. See the Student Engagement Inventory at the end of this syllabus.

**Tentative course outline, by week** (as of 11/05/08, a few readings still to be added/changed):

This is a new course. Topics may be substituted or supplemented according to student demand, at the discretion of the instructor.

1. A smattering of philosophy; idealism vs. pragmatism; humans as the dominant species, for better or worse; how can we measure what humans *are willing to give up* for improved or preserved environmental quality? What about natural human impatience and discounting the future?
  - a. Carver, Thomas N. (1920) “Wealth and Well-Being” Chapter II in *Elementary Economics*. Boston: Ginn and Company; p. 8-15, especially p. 8-9 {motivation for the title of Adam Smith’s 1776 *Wealth of Nations*} [2 pages]
  - b. [Roughgarden, J. \(2001\)](#) “Guide to Diplomatic Relations with Economists,” *Bulletin of the Ecological Society of America*, 82, p. 85-88. {An ecologist explains economists} [4 pages]
  - c. Grafton, R. Quentin and John C.V. Pezzey (2005) “Economics of the Environment,” Chapter 4 in *Understanding the Environment: Bridging the disciplinary divides*, R. Quentin Grafton, Libby Robin and Robert J. Wasson (eds.) Sydney, Australia: UNSW Press. p. 40-56 {a partial substitute for Jaeger reading below} [17 pages].
  - d. Jaeger, William K. (2005) “Economic Analysis in Brief,” Chapter 1 in *Environmental Economics: for tree huggers and other skeptics*. Washington: Island Press. p. 1-13 {a partial substitute for the Grafton reading above} [13 pages]

- e. Field, Barry C. (2008) *Natural Resource Economics: An Introduction*, 2<sup>nd</sup> edition, Long Grove, Illinois: Waveland Press. Chapter 3, “Willingness to Pay/Demand”, p. 41-56 [16 pages]
  - f. [Goulder, Lawrence H. and Robert N. Stavins \(2002\)](#) “Discounting: An Eye on the Future,” *Nature* (419) p. 673-674. [2 pages]
  - g. *OPTIONAL*: Hackett, Steven C. (1998) *Environmental and Natural Resources Economics: Theory, Policy, and the Sustainable Society*. Armonk, NY: M.E. Sharpe. Chapter 2: “Value Systems and Economic Systems,” p. 17-31 {alternative philosophical frameworks} [16 pages]
2. How can we measure what humans *would have to give up* for improved or preserved environmental quality? Engineering costs versus other considerations; principles of welfare assessment; arguments for and against the use of formal benefit-cost analysis as an input to environmental decision-making; environmental regulation in practice in the U.S.; the safety standards, cost-effectiveness, efficiency [**Problem Set #1 due; 6 2/3 %**]
- a. Goodstein, Eban S. (2005) “Measuring the Costs of Environmental Protection,” Chapter 9.0-9.4, 9.6 in *Economics and the Environment*,” 4e, John Wiley & Sons. p. 164-179, 184-185. [18 pages]
  - b. [Palmer, Karen, Wallace E. Oates, and Paul R. Portney \(1995\)](#) “Tightening Environmental Standards: The Benefit-Cost or the No-Cost Paradigm?” *Journal of Economic Perspectives*, 9(4): 119-132. Reprinted in EESR. [34 pages]
  - c. Arrow, Kenneth J, Maureen L. Cropper, George C. Eads, Robert W. Hahn, Lester B. Lave, Roger G. Noll, Paul R. Portney, Milton Russell, Richard Schmalensee, V. Kerry Smith, Robert N. Stavins (1996) “Is There a Role for Benefit-Cost Analysis in Environmental, Health, and Safety Regulation?” *Science* (272) p. 221-222 (April 12). Reprinted in EESR. [2 pages]
  - d. Goodstein, Eban (2005) “The Efficiency Standard,” Chapter 4 in *Economics and the Environment*,” 4e, John Wiley & Sons, p. 49-65 [17 pages]
  - e. Goodstein, Eban (2005) “The Safety Standard,” Chapter 5 in *Economics and the Environment*,” 4e, John Wiley & Sons, p. 66-82 [17 pages]
  - f. *OPTIONAL*: Kelman, Steven (1981) “Cost-Benefit Analysis: An Ethical Critique,” *AEI Journal on Government and Society Regulation* Jan/Feb, p. 33-40, replies in Mar/Apr, reprinted as Chapter 14 in Robert N. Stavins (ed.) *Economics of the Environment: Selected Readings*, p. 260-275 including replies [16 pages]
  - g. *OPTIONAL*: U.S. Environmental Protection Agency, *Guidelines for Preparing Economic Analyses*, [External Review Draft](#), September 2, 2008, 274 pp. {huge document; for now, just browse the Table of Contents, p. i-vi, to understand scope of benefit-cost analyses} [6 pages]
3. What costs are we willing to incur due to regulations designed to reduce risks to human life and health? Hazard pay for dangerous jobs, expenditures to avoid or avert health effects, survey methods; differences by type of risk and characteristics of the affected population; why life insurance and health insurance premiums don’t tell us what we need to know
- a. [Hammitt, James K. \(2000\)](#) “Valuing Mortality Risk: Theory and Practice,” *Environmental Science and Technology* 34, p.1396-1400. [5 pages]

- b. U.S. EPA (2008) Guidelines for Preparing Economic Analyses, [External Review Draft](#), September 2, 2008, 274 pp., Appendix B: Mortality Risk Valuation Estimates, p. B1-B8 [8 pages]
  - c. [Dickie, Mark and John List \(2006\)](#) “Economic Valuation of Health for Environmental Policy: Comparing Alternative Approaches. Introduction and Overview,” *Environmental and Resource Economics* 34, p.339-346. {overview of papers in a special issue on this topic; VSL versus QALYs} [7 pages]
  - d. [Cameron, Trudy Ann \(2008\)](#) “The Value of a Statistical Life: [They] do not think it means what [we] think it means,” *AERE Newsletter*, Association of Environmental and Resource Economists, 28(1), p. {a plea to change the misleading terminology used by economists} [4 pages]
  - e. Dickie, Mark (2003) “Defensive Behavior and Damage Cost Methods,” Chapter 11 in Patricia A Champ, Kevin J. Boyle, and Thomas C. Brown (eds) *A Primer on Nonmarket Valuation*, Dordrecht, Netherlands: Kluwer Academic Publishers. {section 1, 3.1-3.2, 3.6; 4-6 (Cost-of-illness method)} [21 pages]
4. What costs are we willing to incur to protect ecological systems and their services? Travel cost methods, property value methods, survey-based methods; the challenges of heterogeneous resources; how welfare assessment differs from impact assessment [Problem Set #2 due; 6 2/3 %]
- a. Parsons, George R. (2003) “The Travel Cost Model,” Chapter 9.1-9.2 in Patricia A Champ, Kevin J. Boyle, and Thomas C. Brown (eds) *A Primer on Nonmarket Valuation*, Dordrecht, Netherlands: Kluwer Academic Publishers. p. 269-296. {just skim the more-technical details in section 2.2.8: Estimate the Model and section 2.2.9: Calculate Access Value} [27 pages]
  - b. Taylor, Laura O. (2003) “The Hedonic Method,” Chapter 10 in Patricia A Champ, Kevin J. Boyle, and Thomas C. Brown (eds) *A Primer on Nonmarket Valuation*, Dordrecht, Netherlands: Kluwer Academic Publishers. Sections 1, 2.0 (skip 2.1), 3, 3.1-3.3, the words in section 4, skim section 6 (VSL estimation), read section 7. [about 30 pages]
  - c. [Carson, Richard T. \(2000\)](#) “Contingent Valuation: A User’s Guide,” *Environmental Science and Technology* (34) p. 1413-1418. [6 pages]
  - d. *OPTIONAL*: [Carson, Richard T., Robert C. Mitchell, Michael Hanemann, Raymond J. Kopp, Stanley Presser, Paul A. Ruud \(2003\)](#) “Contingent Valuation and Lost Passive Use: Damages from the Exxon Valdez Oil Spill,” *Environmental and Resource Economics* 25, p. 257-286 [30 pages]
  - e. *OPTIONAL*: [Hanley, Nick, Robert E. Wright, and Vic Adamowicz \(1998\)](#) “Using Choice Experiments to Value the Environment,” *Environmental and Resource Economics* 11, p. 413-428. [15 pages] {an early example; don’t worry about the math...read around it if necessary}

**Midterm 1** (20%) – 1 hour long, material to end of Week 3; Probably about ten non-trivial multiple-choice questions and four short-answer questions (*about* one-third page each)

- 5. Managing pollution: external costs; legal rights and the potential for negotiated solutions; liability; why compensatory damages in natural resources lawsuits don’t necessarily tell us what we need to know; getting the most “bang for the buck” in efforts

to clean up the environment; command-and-control methods, green taxes (and the potential for a double dividend)

- a. Field, Barry C. and Martha K. Field (2009) *Environmental Economics: An Introduction*, Chapter 10 “Decentralized Policies: Liability Laws, Property Rights, Voluntary Action,” p. 194-211. [17 pages]
  - b. Field, Barry C. and Martha K. Field (2009) *Environmental Economics: An Introduction*, Chapter 11 “Command-and-Control Strategies: The Case of Standards,” p. 212-231. [20 pages]
  - c. Field, Barry C. and Martha K. Field (2009) *Environmental Economics: An Introduction*, Chapter 12 “Incentive-Based Strategies: Emission Charges and Subsidies,” p. 232-254. [19 pages]
  - d. Goodstein, Eban S. (2005) “Measuring the Costs of Environmental Protection,” Chapter 9.5 in *Economics and the Environment*, 4e, John Wiley & Sons. p. 179-183 {remainder of chapter above: the double dividend} [5 pages].
6. Managing stationary sources of pollution; tradable permits (e.g. cap-and-trade), emissions permits versus ambient permits; emission reduction credits; the sulfur allowance program to control acid rain; the RECLAIM program in Los Angeles; carbon trading
- a. Field, Barry C. and Martha K. Field (2009) *Environmental Economics: An Introduction*, Chapter 13 “Incentive-Based Strategies: Transferable Discharge Permits,” p. 255-271. [17 pages]
  - b. Sandel, Michael J. (1997) “It’s Immoral to Buy the Right to Pollute,” editorial in the New York Times, December 15, p. A29, and replies printed December 17, 1997. Reprinted as Chapter 18 in Robert N. Stavins (ed.) *Economics of the Environment: Selected Readings*, p. 355-358 including replies. [4 pages]
  - c. [Stavins, Robert N. \(2008\)](#) “A Meaningful U.S. Cap-and-Trade System to Address Climate Change,” *Harvard Environmental Law Review* 32(2), 293-371. {especially Section 1, p. 293-305, Section 5, p. 353-357 (common objections and responses), Appendix, p. 359-371 (more details on past and current examples of cap-and-trade mechanisms) [30 pages]
  - d. *OPTIONAL*: [Stavins, Robert N. \(2008\)](#) “A Meaningful U.S. Cap-and-Trade System to Address Climate Change,” *Harvard Environmental Law Review* 32(2), 293-371. {the actual proposal} p. 305-353. [48 pages]
7. Managing mobile sources of pollution; why vehicle-miles travelled tend to be greater than socially optimal; CAFE standards; fuel economy versus safety arguments; emissions standards; MTBE, ethanol, biofuels and unintended consequences. **[Problem Set #3 due; 6 2/3 %]**
- a. Portney, Paul R. “Penny-Wise and Pound-Fuelish? New Car Mileage Standards in the United States,” Chapter 13 in Oates, Wallace E., (ed) (2006) *The RFF Reader in Environmental and Resource Policy*, 2<sup>nd</sup> edition, Washington, DC: RFF Press, p. 77-82 [6 pages]
  - b. Parry, Ian “Is Gasoline Undertaxed in the United States?” Chapter 14 in Oates, Wallace E., (ed) (2006) *The RFF Reader in Environmental and Resource Policy*, 2<sup>nd</sup> edition, Washington, DC: RFF Press, p. 83-88 [6 pages]

- c. Parry, Ian, and Elena Safirova, "Pay as you Slow: Road Pricing to Reduce Traffic Congestion," Chapter 15 in Oates, Wallace E., (ed) (2006) *The RFF Reader in Environmental and Resource Policy*, 2<sup>nd</sup> edition, Washington, DC: RFF Press, p. 88-92 [5 pages]
- d. [Schneider, Uwe and Bruce A. McCarl \(2003\)](#) "Economic Potential of Biomass Based Fuels for Greenhouse Gas Emission Mitigation," *Environmental and Resource Economics* 24, 291-312. {use of a computable general equilibrium model—read for the factors which are considered, not the details of the model} [22 pages]
- e. pending

**Midterm 2** (20%) – 1 hour long, Material to end of Week 6; Probably about ten non-trivial multiple-choice questions and four short-answer questions (*about* one-third page each)

- 8. Managing exhaustible resources; incentives for management of privately owned mines or wells and for mining or drilling operations on public lands; property rights and the fact that extracting and using a ton of ore (barrel of oil) now means it won't be there later when you might need it more; the rationale for royalty payments, stumpage charges.
  - a. Field, Barry C. (2008) *Natural Resource Economics: An Introduction*, 2<sup>nd</sup> edition, Long Grove, Illinois: Waveland Press, Exhibit 7-2, page 119 {how US sells public domain resources} [1 page]
  - b. Field, Barry C. (2008) *Natural Resource Economics: An Introduction*, 2<sup>nd</sup> edition, Long Grove, Illinois: Waveland Press, Chapter 10: Mineral Economics, p. 169-192 [23 pages]
  - c. **OPTIONAL:** Field, Barry C. (2008) *Natural Resource Economics: An Introduction*, 2<sup>nd</sup> edition, Long Grove, Illinois: Waveland Press, Chapter 11: Energy, 193-218 [25 pages]
  - d. pending
  
- 9. Managing renewable but depletable resources which are spatially fixed; commercial exploitation of forests; slash-and-burn; silviculture and forests as crops; multiple-use management and non-timber values of forests [**Problem Set #4 due; 6 2/3 %**]
  - a. Field, Barry C. (2008) *Natural Resource Economics: An Introduction*, 2<sup>nd</sup> edition, Long Grove, Illinois: Waveland Press, Chapter 12: Forest Economics, p. 219-238 [20 pages]
  - b. Sedjo, Roger A. "Ecosystem Management: An Uncharted Path for Public Forests," Chapter 25 in Oates, Wallace E., (ed) (2006) *The RFF Reader in Environmental and Resource Policy*, 2<sup>nd</sup> edition, Washington, DC: RFF Press, p. 141-145 [5 pages]
  - c. pending
  
- 10. Managing renewable but depletable and often open-access resources: commercial and recreational fisheries; wild fisheries, mariculture and aquaculture; maximum sustained yield versus efficient management versus free-for-all exploitation; high-grading, by-catch, costly enforcement; gear restrictions, taxes on fishing effort, individual transferable quotas (ITQs), individual transferable share quotas (ITSQs).

- a. Field, Barry C. (2008) *Natural Resource Economics: An Introduction*, 2<sup>nd</sup> edition, Long Grove, Illinois: Waveland Press, Chapter 13: Marine Resources, p. 239-260 [21 pages]
- b. Sanchirico, James and Richard Newell, “Catching Market Efficiencies: Quota-Based Fisheries Management” Chapter 23 in Oates, Wallace E., (ed) (2006) *The RFF Reader in Environmental and Resource Policy*, 2<sup>nd</sup> edition, Washington, DC: RFF Press, p. 131-135 [5 pages]
- c. Grafton, R. Q., R. Arnason, T. Bjorndal, D. Campbell, H. F. Campbell, C. W. Clark, R. Connor, D. Dupont, R. Hannesson, R. Hilborn, J. E. Kirkley, T. Kompas, D. E. Lane, G. R. Munro, S. Pascoe, D. Squires, S. I. Stenshamn, B. R. Turris & Q. Weninger (2006) “Incentive-based approaches to sustainable fisheries,” *Canadian Journal of Fisheries and Aquatic Sciences*, **63**, 699-710. [12 pages]
- d. *OPTIONAL*: [National Ocean Economics Program](#) non-market values inventory

**Final Exam** (40%) – 2 hours long; Primarily material from Week 7 to Week 10 but some earlier material; Probably about twenty non-trivial multiple-choice questions and eight short-answer questions (*about* one-third page each)

### Requirements and Grading:

Best 3 of 4 homework sets @ 6 2/3 %	= 20%
Two in-class midterms @ 20%	= 40%
One in-class final	= 40%

Homework assignments will have a format that mimics the midterm exams. Homeworks must be turned in when they are due, which is the end of the last lecture in the week where they are due. In lieu of make-ups for missed assignments, we will automatically drop your single lowest score, which may include zeros for missing or late assignments. For a second missing assignment not to be counted as zero, a documented and eligible excuse must be provided (such as the student’s own illness, or a death in the immediate family).

Exams are closed-book. We may require up to one week to complete grading. Exams must be written as scheduled unless there is a documented and eligible excuse (see above). There will be no make-up midterm exams; with a valid excuse, scores on the other requirements will be reweighted. No one may write an exam prior to its scheduled time. Please plan accordingly for any travel over the quarter break.

In a sufficiently large introductory class at the 300 level where students display a typical distribution of effort levels, I typically expect to give roughly 60% A’s and B’s. I reserve A+ grades for distinctly exceptional performance relative to the rest of the class and I have rarely given more than one or two such grades in any class, regardless of size. As an economist, I am entirely sympathetic that students have many different demands on their time, and different priorities for this class relative to their other coursework. I view course grades as indicators of the amount of time and effort that students have decided to devote to the course, in whatever manner is optimal for them personally. My grading rubric is generally as follows:

- A = shows strong understanding of almost all of the big ideas introduced in the course (although these students might not have picked up on every one of the more esoteric points)
- B = shows good understanding of a majority of the biggest ideas in the course, but may display some gaps in understanding for a few of them
- C = shows good understanding of some ideas, but reveals a worrisome cause for concern about their understanding of other ideas
- F = relatively little evidence that enrollment in the course has produced much value-added in terms of the student's understanding of the issues; inability to invoke the ideas introduced in the course in the relevant contexts.

### Student Engagement Inventory

(At UO, student engagement hours must total 120 hours per term for a 4 credit course):

Activity	Elaboration	Hours
Course attendance	Verified periodically	40 hours (4 hours per week)
Assigned readings	Course reader: selected book chapters, journal articles; news items (initial inventory at <a href="http://www.uoregon.edu/~cameron/envnews">www.uoregon.edu/~cameron/envnews</a> contact instructor for current login and password); supplementary instructor notes	60 hours (6 hours per week)
Homework sets	Mixed formats: short answers (up to a few paragraphs), non-trivial multiple choice questions to conserve on grading hours	20 hours (5 hours for each of four assignments)