

ECON 9310 (85489)
Environmental & Resource Economics I
Aderhold Learning Center (203)
MW 3pm-4:15

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Office Hours: 12:15 pm – 1:15 pm Wednesday (or by appointment)

Course Description:

The purpose of the course is to provide a survey of issues in resource and environmental economics, to cover some of the major contributions that have been generated by the field, and to offer students the opportunity to hone their analytical and professional skills so that they can read and contribute to the literature in resource and environmental economics. There is a huge literature in environmental and resource economics; if you were to search the EconLit database on “Environment” and “Conservation OR Pollution,” you would generate over 17,000 hits from 1979-2001. We will cover only a tiny, but important, fraction of this literature. I have outlined a provisional syllabus below, but we can adapt it based on student interest and background. The main emphasis of the course is like any other course: to encourage students to think critically, to speak and write simply and clearly, to own and use a body of facts and ideas that are widely known, to detect errors and fallacies, to resolve intellectual problems, and to advance our collective knowledge through independent research.

Course Prerequisites:

Econ 8100, Econ 8120, and a course covering the theory and methods of dynamic optimization, especially the maximum principle. Previous exposure to environmental economics will be helpful, but is not required.

Required Textbook:

Hanley, N., J. Shogren, and B. White. 1997. *Environmental Economics in Theory and in Practice*. Oxford University Press, New York.

Much of the course will be based on journal articles and most of these are available via the Pullen Library electronic journals portal (<http://wwwlib.gsu.edu/ejournals/>). Articles that are not available on-line will be distributed through e-mail or hard copy to students.

Recommended Textbooks:

Baumol and Oates (1988), *The Theory of Environmental Policy*, Cambridge University Press, Cambridge, UK. (if you plan to write your dissertation in this field, you should have your own copy of this book)

Conrad, J. M. and C. W. Clark. 1987. *Natural Resource Economics: Notes and Problems*. Cambridge University Press, Cambridge, UK.

Grading:

I will grade you based on your performance on homework problems, one manuscript review, and a term paper. Please remember that all university regulations, deadlines, and policies must be observed (including Academic Honesty policy).

Homework Problems (20% of grade)

The homework problem sets are designed to bridge the gap between the teaching of theory and the application of that theory to environmental questions. Four homework sets will focus on applications of optimal control theory to resource management. If time and interest permit, we may also solve a few problems related to issues such as pollution permit trading in an additional homework set. By doing the homework sets, students will make the theory operational and will apply numerical techniques to solve the equations that define a potential solution. Students can use whatever software they wish to solve the numerical exercises, but all homework problems can be solved using the Solver Tool in Microsoft Excel. Students can discuss homework sets among each other, but each student must hand in his or her own work.

Manuscript Review (20% of grade)

The purpose of the manuscript review is two-fold: (1) to offer you the opportunity to apply your economic knowledge to evaluating an original piece of research; and (2) to offer you the opportunity to see what might be involved in conducting a review of an article for a journal or agency. There are essentially five main components to the assigned review:

1. Replicate all analytical results, including intermediate steps.
2. Characterize in words what the action or activity the model represents. What question(s) is the author trying to answer? What are the conclusions?
3. Does the author neglect anything from the past literature on this topic or does the author misrepresent her contribution?
4. Identify strengths of the paper. Identify errors or weaknesses of paper, if any (e.g., hard to justify assumptions, strange formulation of the model), or how the

- results may change with a realistic change in assumptions or addition of other factors (for the latter, try to show something analytically or with a numerical example, but if you cannot, simply discuss how the results may change if one were to change an assumption or a variable). If you cannot find any errors or weaknesses associated with the paper's findings or assumptions (there may be none), try creating a numerical example to either confirm or contradict the author's conclusions.
5. Ideas for extensions or future research on the topic.

The replication of the analytical results can be done by hand or typed. The rest of the review must be typed and should be 4-8 pages double-spaced (12 point font) with one-inch margins on all sides.

Final Paper (55% of grade)

The final paper is designed to encourage you to do an original research paper on an environmental or resource economics topic of your choice. You should pick a topic that interests you, but I will offer suggestions for papers for those of you who have trouble coming up with one on your own. We will discuss the paper in more detail in class. The basic idea of the paper is that it should be publishable *somewhere* (whether you publish it or not is your choice). I am not asking for a major breakthrough that is destined for a top journal. Choose something manageable that demonstrates you can formulate an interesting policy question, can apply your knowledge of economics and the real world to attempt to answer the question, and can communicate your results clearly, concisely, and cogently. A well-posed and answered "small" question is much more desirable than an ambitious, but convoluted and opaque tome. The approximate weights on different characteristics of the paper are:

- (30%) Explanation of the issue and the motivation for the analysis (includes literature review)
- (35%) Analysis
- (30%) Policy implications. If the first part of your paper was good (i.e., the formulation and motivation of the question), but the results do not point to much in the way of policy implications, that is O.K.
- (5%) 10-25 minute presentation of your draft paper to the class (presentation length will depend on class size)

I will give you two examples of papers that received "A"s in my 2001 class (one is theoretical and one is empirical). Papers that received poor grades generally were incomprehensible or demonstrated a lack of understanding of the material being presented in the paper. The authors of these papers also tended to have waited until the last minute to begin their analysis.

The paper topic must be selected in consultation with me. A two-paged proposal must be handed in by 13 October. The earlier you hand in a proposal, the more input I

can have in directing your research. A 3-5 page literature review and, if necessary, a more clearly formulated research question is due on 27 October. Each of you will meet with me in my office during the week of November 10 to discuss the progress of your paper and any problems you may be having.

I recommend, but do not require, that you complete your preliminary results by 14 November and generate a draft paper by 1 December. Class presentations will be on 1 and 3 December.

The final paper is due on the day of the regularly scheduled final exam. The paper must not be more than 25 pages double-spaced (12 point font) with one-inch margins on all sides, excluding references and figures.

Class Participation (5% of grade)

Class participation essentially means that you show up for most classes (no need to give me excuses for missed classes) and you show up having read the assigned readings on most days. I will speak more about what I mean by class participation on the first day of class. As a commitment device, I periodically ask students to type up one page of comments and questions on the readings and bring it to class. These comment sheets will count towards class participation. If the class is small enough, I may also assign students to do a brief presentation on one of the readings.

Preliminary Course Outline:

- I. Nonrenewable Resources
- II. Renewable Resources
- III. Optimal Stopping Rules
- IV. Water (using dynamic analysis tools for spatial analysis)
- V. Theory of Externalities
- VI. Optimal Policies for Internalizing the Externality (The Pigouvian Tax, etc.)
- VII. Environmental Policy Under Uncertainty, and Implications for Choice of Policy Instrument
- VIII. Optimal Pricing in the Long Run
- IX. A Comparison of the Tax on Pollution with a Subsidy for Not Polluting
- X. Standards or Target Approach
- XI. Program Evaluation (the econometrics of estimating the causal effects of policy interventions)
- XII. Information Disclosure Strategies
- XIII. Paper Presentations

Reading Assignments (* indicates required reading):

Hanley, N., J. Shogren, and B. White. 1997. *Environmental Economics in Theory and in Practice*. Chapter 1 (required if you have never had a class in environmental economics and recommended for everyone else)

Non-renewable Resources

Krautkraemer, J. A. 1998. "Nonrenewable Resource Scarcity," *Journal of Economic Literature*, 36(Dec): 2065-2107 (Sections 1-3, Sections 6.1-6.2, Section 7). *

Hanley, N., J. Shogren, and B. White. 1997. *Environmental Economics in Theory and in Practice*. Chapters 8-9 (Chapter 7 provides a review of dynamic optimization techniques)*

Conrad and Clark. 1987. Chapter 3.

Devarajan, S. and A. C. Fisher. 1981. "Hotelling's 'Economics of Exhaustible Resources' Fifty Years Later," *Journal of Economic Literature*, 19(March):65-73. (Nice summary)

Pindyck, R. S. 1978. "The Optimal Exploration and Production of Nonrenewable Resources," *Journal of Political Economy*, 86(5):841-861. *

Pindyck, R. S. 1980. "Uncertainty and Exhaustible Resource Markets," *Journal of Political Economy*, 88(6):1203-1225.

Dixit, A. 1989. "Entry and Exit Decisions under Uncertainty," *Journal of Political Economy*, 97(3):620-638.*

Renewable Resources

Brown, G.M. 2000. "Renewable Natural Resource Management and Use without Markets." *Journal of Economic Literature*, 38(Dec): 875-914. (Section 1-3.1; Sections 4-5)* (Section 6 and 8 recommended)

Hanley, N., J. Shogren, and B. White. 1997. *Environmental Economics in Theory and in Practice*. Chapter 10 (and Chapter 2, section 4) *

Conrad and Clark. 1987. Chapter 2, Sections 2.1-2.8.

Homans, F. R. and J. E. Wilen. 1997. "A Model of Regulated Open Access Resource Use," *Journal of Environmental Economics and Management*, 32(1):1-21.

Pindyck, R. S. 1984. "Uncertainty in the Theory of Renewable Resource Markets," *Review of Economic Studies*, 51(April):289-303. *

Optimal Stopping Rules

Brown, G.M. 2000. "Renewable Natural Resource Management and Use without Markets." *Journal of Economic Literature*, 38(Dec): 875-914. (Section 3.2)*

Hanley, N., J. Shogren, and B. White. 1997. *Environmental Economics in Theory and in Practice*. Chapter 11. *

Clarke, H. R. and W. J. Reed. 1990. "Applications of Optimal Stopping Rules in Resource Economics." *Economic Record*, 66: 254-265.

Pindyck, Robert S. 2001. Optimal Timing Problems in Environmental Economics. MIT Working Paper Draft. March 21, 2001.

Water

Gisser, M., and D.A. Sanchez. 1980. Competition versus Optimal Control in Groundwater Pumping. *Water Resources Research* 16(4): 638-642.*

Gisser, 1983, "Groundwater: Focusing on the Real Issue," *Journal of Political Economy*, 91: 1001-27.*

Chakravorty, U., C. Umetsu and D. Zilberman. 2001. Spatial Water Management Under Alternative Institutional Arrangements. Working Paper.*

Theory of Externalities

Cropper and Oates, (1992) "Environmental Economics: A Survey," *Journal of Economic Literature*, pp.675-700.*

Hanley, N., J. Shogren, and B. White. 1997. *Environmental Economics in Theory and in Practice*. Chapter 2*

Baumol and Oates (1988), *The Theory of Environmental Policy*, Chapters 1-3.*

Coase, Ronald H., "The Problem of Social Cost," *The Journal of Law and Economics* 3, October 1960, 1-44.

Optimal Policies for Internalizing the Externality

Cropper and Oates, (1992) "Environmental Economics: A Survey," *Journal of Economic Literature*, pp.675-700. *

Baumol and Oates (1988), *The Theory of Environmental Policy*, Chapter 4.*

Hanley, N., J. Shogren, and B. White. 1997. *Environmental Economics in Theory and in Practice*. Chapter 3-5.*

Sandel, Michael J., "It's Immoral to Buy the Right To Pollute," New York Times, Dec. 15 1997, p.A29

Optimal Pricing in the Long Run

Spulber. 1985. "Effluent Regulation and Long-Run Optimality," *JEEM*, pp. 103-16.*

Charges and Standards (or Target) Approach

Baumol and Oates (1988), *The Theory of Environmental Policy*, Chapter 11.*

Ferraro, P.J. 2001. Targeting Conservation Contracts in Heterogeneous Landscapes: an application to watershed management. Working Paper.*

A Comparison of the Tax on Pollution with a Subsidy for Not Polluting

Baumol and Oates (1988), *The Theory of Environmental Policy*, Chapter 14.*

Environmental Policy Under Uncertainty, and Implications for Choice of Policy Instrument

Baumol and Oates (1988), *The Theory of Environmental Policy*, Chapter 5.* (11 & 13)

Weitzman, (1974), "Prices vs. Quantities," *Review of Economic Studies*, XLI:
pp. 477-49.

Stavins, (1996), "Correlated Uncertainty and Policy Instrument Choice," *JEEM*, 30: pp. 218-32.

Segerson (1988), "Uncertainty and Incentives for Nonpoint Pollution Control",
JEEM, 15: pp. 87-98.

Other readings will be assigned for topics XI and XIII, once we ascertain student interests. For more information, see supplemental bibliography of other relevant articles on subjects we cover in class and other subjects we will not cover. I also recommend that you take a look at recent issues of the *International Yearbook of Environmental and Resource Economics* series. This series (edited by Tietenberg and Folmer) has good

survey articles on different topics. NOTE: The course syllabus provides a general plan for the course; deviations may be necessary.