

THE GEORGE WASHINGTON UNIVERSITY

Department of Economics

Environmental and Resource Economics, ECON 395.11

Spring 2008

Thursday 7:10-9:40 pm, Gov 321

INSTRUCTOR: Arun Malik (Office Hours: MW 4:30-6:00 pm, and by appointment, Gov 305, Tel. 202-994-5471, amalik@gwu.edu)

COURSE DESCRIPTION. The course will consist of a survey of the literature on environmental economics with an emphasis on environmental regulation, and an introduction to the literatures on common property resources, environment and development, and climate change and sustainability. Exhaustible resource theory will not be covered. There will be some coverage of renewable resource theory in the section on common property resources. The prerequisites for the course are graduate level microeconomic theory (Econ 301, 302, and 303 or equivalents).

REQUIREMENTS AND GRADING. Approximately four homework assignments will be handed out over the course of the semester. The assignments will take the form of problem sets or article reviews. Assignments will not be accepted after the day on which they are due; however, the assignment with the lowest grade will be dropped when calculating course grades.

There will be a midterm exam and a final exam, both will be take homes. The midterm exam will be given in early March.

Students have the option of writing a paper that critically reviews 3-5 articles on a particular topic. Writing a paper reduces the weight given to the homework and exams when calculating the course grade (details below). The paper must be at least 15 pages in length and is due on May 2, 2008. Students who choose to write a paper should discuss their topics with me by April 3, 2008.

For students who choose not to write a paper, the course grade will be calculated using the following weights: homework – 30 percent, midterm exam – 35 percent, final exam -- 35 percent. Students who choose to write a paper will be able to shift a total of 20 percentage points from one or both exams to the paper, and 5 percentage points from the homework. Thus, the paper will count for 25 percent of the course grade.

TOPICS AND READINGS. A tentative list of topics to be covered and accompanying readings are presented below. Readings are divided into two categories: required and optional. Required readings are marked with an asterisk (*). Required readings from outside the textbook will be made available via Blackboard or handed out in class. For each topic, required readings are listed in the order in which they should be read. Students should at least skim these readings before the class in which they are discussed. The textbook for the course is listed below together with the abbreviation used when referring to it in the reading list:

(HSW) N. Hanley, J.F. Shogren, and B. White, *Environmental Economics in Theory and Practice*, 2nd ed., Palgrave Macmillan, 2007.

Some of the readings for the course are contained in the following edited volume, which is an optional purchase:

(Stavins) Robert N. Stavins (ed.), *Economics of the Environment, Selected Readings*, Norton, 2000.

Other books that you may find helpful are listed at the end of this document. To the extent possible, these books will be placed on reserve in the library.

For the material covered in Topics 1 and 2, the following survey article, though old, is very useful and should be read as we make our way through the two topics:

Maureen L. Cropper and Wallace E. Oates, "Environmental Economics: A Survey," *Journal of Economic Literature*, Vol. 30, No. 2, 1992, pp. 675-740. [Reprinted in Stavins.]

TOPIC 1: ENVIRONMENTAL REGULATION (7 classes)

A. Basic Theory

*HSW, Chapter 1, Sections 3.1-3.6, 4.1, 4.2.3, 4.2.4, and Chapter 5

*Paul Burrows, "Nonconvexities and the Theory of External Cost," in *The Handbook of Environmental Economics*, ed. by D. Bromley, Basil Blackwell, 1995.

*John Pezzey, "Emission Taxes and Tradeable Permits: A Comparison of Views on Long-Run Efficiency," *Environmental and Resource Economics*, vol. 26, No. 2, October 2003.

*Scott R. Milliman and Raymond Prince, "Firm incentives to promote technological change in pollution control," *Journal of Environmental Economics and Management*, 17:247-265, 1989.

Till Requate and Wolfram Unold, "Environmental policy incentives to adopt advanced abatement technology: Will the true ranking please stand up?," *European Economic Review*, vol. 47, issue 1, pp. 125-146, 2003.

Leonid Hurwicz, "Revisiting Externalities," *Journal of Public Economic Theory*, vol. 1, pp. 225-45, 1999.

Baumol and Oates, Chapters 1, 2, 3 and 4 [pp. 1-56]

Ross McKittrick and R.A. Collinge, "Linear Pigouvian taxes and the optimal size of a polluting industry," *Canadian Journal of Economics*, vol. 33, pp. 1106-1119, 2000.

Daniel Spulber, "Effluent Regulation and Long-Run Optimality," *Journal of Environmental Economics and Management*, Vol. 12, 1985, pp. 103-116.

W. David Montgomery, "Markets in Licenses and Efficient Pollution Control Programs," *Journal of Economic Theory*, vol. 5, pp. 395-418, 1972.

Catherine Kling and Jonathan Rubin, "Bankable permits for the control of environmental pollution," *Journal of Public Economics* 64: 101-115, 1997.

B. Uncertainty and Asymmetric Information

*HSW, Sections 4.2.1, 4.2.2, and 4.4

*Stavins, Robert N., "Correlated Uncertainty and Policy Instrument Choice," *Journal of Environmental Economics and Management*, Vol. 30, pp. 218-232, 1996.

*Richard Newell and William A. Pizer, "Regulating Stock Externalities Under Uncertainty," *Journal of Environmental Economics and Management*, vol. 45, No. 2, Supplement 1, pp. 416-432, 2003.

*Kathleen Segerson, "Uncertainty and Incentives for Nonpoint Pollution Control," *Journal of Environmental Economics and Management*, Vol. 15, 1988, pp. 87-98.

Baumol and Oates, Chapter 5 [pp. 57-78]

Partha Dasgupta, "Environmental Control under Uncertainty," Chapter 4 in Partha Dasgupta, *The Control of Resources*, Harvard University Press, 1982, pp. 68-99 (including appendix).

Marc J. Roberts and Michael Spence, "Effluent Charges and Licenses Under Uncertainty," *Journal of Public Economics*, vol. 5, pp. 193-208, 1976.

TOPIC 1: ENVIRONMENTAL REGULATION

B. Uncertainty and Asymmetric Information (cont.)

Tracy Lewis, "Protecting the Environment when Costs and Benefits are Privately Known," *RAND Journal of Economics*, 27, pp. 819-47, 1996.

Martin Weitzman, "Prices vs. Quantities," *Review of Economic Studies* 41:477-91, 1974. [A more readable generalization of this classic article is: Martin Weitzman, "Optimal Rewards for Economic Regulation," *American Economic Review*, 68(4), September 1978, pp. 683-691.]

C. Market Imperfections

*Wallace Oates and Diana Strassman, "Effluent Fees and Market Structure," *Journal of Public Economics* 24: 29-46, 1984.

*Arun Malik, "Further Results on Permit Markets with Market Power and Cheating," *Journal of Environmental Economics and Management*, vol. 44, no. 3, pp. 371-390, 2002.

*Larry Goulder, Ian Parry and Dallas Burtraw, "Revenue-Raising versus Other Approaches to Environmental Protection: The Critical Significance of Preexisting Tax Distortions," *Rand Journal of Economics*, 28:708-3, 1997.

Robert Hahn, "Market Power and Transferable Property Rights," *Quarterly Journal of Economics*, vol. 99, pp. 753-765, November 1984.

Eban Goodstein, "Policy Implications from the Double-Dividend Debate," *Land Economics*, 79:402-14, 2003.

Larry Goulder, "Environmental Taxation and the 'double dividend': a Reader's Guide," NBER Working Paper 4896, 1994.

A. Lans Bovenberg and Ruud A. de Mooij, "Environmental Levies and Distortionary Taxation," *American Economic Review* 84:1085-89, 1994.

D. Liability Rules and Enforcement

*HSW Section 4.3

*Kathleen Segerson, "Liability and penalty structures in policy design," in *The Handbook of Environmental Economics*, D. Bromley (ed.). Oxford: Basil Blackwell, 1995.

*Charles Kolstad, T. Ulen and G. Johnson, "Ex Ante Regulation vs. Ex Post Liability for Harm: Substitutes or Complements?" *American Economic Review* 80: 888-901, 1990.

*Winston Harrington, "Enforcement leverage when penalties are restricted," *Journal of Public Economics* 37: 29-53, 1988.

Peter Menell, "The limitations of legal institutions for addressing environmental risks," *Journal of Economic Perspectives* 5: 93-113, 1991.

Thomas H. Tietenberg, "Indivisible Toxic Torts: The Economics of Joint and Several Liability," *Land Economics*, 65: 305-319, 1989.

TOPIC 1: ENVIRONMENTAL REGULATION (cont.)

E. Voluntary Approaches

*Kathleen Segerson and Thomas J. Miceli, "Voluntary Environmental Agreements: Good or Bad News for Environmental Protection?" *Journal of Environmental Economics and Management*, 36:109-30, 1998.

*John W. Maxwell, Thomas P. Lyon and Steven C. Hackett, "Self-Regulation and Social Welfare: The Political Economy of Corporate Environmentalism," *Journal of Law and Economics*, 43:583-617, 2000.

Matt Kotchen, "Green Markets and Private Provision of Public Goods," *Journal of Political Economy*, 114:816-34, 2006.

Thomas P. Lyon and John W. Maxwell, "Self-Regulation, Taxation and Public Voluntary Environmental Agreements", *Journal of Public Economics* 87:1453-89, 2003.

Seema Arora and Timothy Cason, "An Experiment in Voluntary Environmental Regulation: Participation in EPA's 33/50 Program," *Journal of Environmental Economics and Management*, vol. 28, pp. 271-86, 1995.

Juan-Pablo Montero, "Voluntary Compliance with Market-Based Environmental Policy: Evidence from the US Acid Rain Program," *Journal of Political Economy* 107:998-1033, 1999.

M.F. Teisl, B. Roe, and R.L. Hicks, "Can Eco-Labels Tune a Market?: Evidence from Dolphin-Safe Labeling," *Journal of Environmental Economics and Management* 43:339-59, 2002.

F. Empirical Analyses of Regulatory Performance

*Wallace Oates, Paul Portney and Albert McGartland, "The Net Benefits of Incentive-based Regulation: A Case Study of Environmental Standard Setting," *American Economic Review*, 79(5), pp.1233-42, 1989.

*Curtis Carlson, D. Burtraw, M. Cropper and K. Palmer, "Sulfur dioxide control by electric utilities: what are the gains from trade?" *Journal of Political Economy* 108: 1292-1326, 2003.

*Scott Atkinson and Tom Tietenberg, "Market Failure in Incentive-Based Regulation: The Case of Emissions Trading," *Journal of Environmental Economics and Management*, vol. 21, 1991, pp. 17-31.

G. D. Libecap and Z.K. Hansen, "Small Farms, Externalities, and the Dust Bowl of the 1930s," *Journal of Political Economy*, 112(3), 665-694, 2004.

Paul Joskow *et al.*, "The Market for Sulfur Dioxide Emissions," *American Economic Review* 88:669-85, 1998.

Hilary Sigman, "A Comparison of Public Policies for Lead Recycling," *Rand Journal of Economics* 26:452-78, 1995.

Robert Hahn, "The impacts of economics on environmental policy," *Journal of Environmental Economics and Management* 39(3): 375-399, 2000.

Maureen Cropper, "Has economic research answered the needs of environmental policy?" *Journal of Environmental Economics and Management* 39(3): 328-350, 2000.

TOPIC 2: VALUATION OF ENVIRONMENTAL AMENITIES (2 classes)

A. Basic Theory

*HSW, Chapter 11

*Richard C. Bishop and Richard T. Woodward, "Valuation of Environmental Quality under Certainty," in *The Handbook of Environmental Economics*, ed. by D. Bromley, Basil Blackwell, 1995, pp. 543-567.

A. Myrick Freeman, Chapters 1,2, 3, and 4.

Per-Olov Johansson, *The Economic Theory and Measurement of Environmental Benefits*, Cambridge University Press, 1987, Chapters 3-6.

B. Valuation Methods

*HSW, Chapter 11

*A. Myrick Freeman, Chapters 11 and 13

Peter A. Diamond and Jerry A. Hausman, "Contingent Valuation: Is Some Number Better than No Number," *Journal of Economic Perspectives*, vol. 8, no. 4, Fall 1994, pp. 45-64. [Reprinted in Stavins.]

Ronald O. Cummings and Laura Taylor, "Unbiased Value Estimates for Environmental Goods: A Cheap Talk Design for the Contingent Valuation Method," *American Economic Review*, vol. 89, no. 3, June 1999, pp. 649-65.

Paul R. Portney, "The Contingent Valuation Debate: Why Economists Should Care," Symposium on Contingent Valuation, *Journal of Economic Perspectives*, vol. 8, no. 4, Fall 1994, pp. 3-17. [Reprinted in Stavins.]

Ronald G. Cummings, et al., "Homegrown Values and Hypothetical Surveys: Is the Dichotomous Choice Approach Incentive Compatible?" *American Economic Review*, vol. 85, no. 1, March 1995, pp. 260-266.

V. Kerry Smith, "Nonmarket Valuation of Environmental Resources: An Interpretive Appraisal," *Land Economics*, vol. 69, 1993, pp. 1-26. [Reprinted in Stavins.]

Harrison, D. and D. Rubinfeld, "Hedonic housing prices and the demand for clean air," *Journal of Environmental Economics and Management* 5: 81-102, 1978.

Nancy E. Bockstael, Kenneth E. McConnell and Ivar E. Strand, "Recreation," in *Measuring the Demand for Environmental Quality*, ed. by J.B. Braden and C.D. Kolstad, North-Holland, 1991.

TOPIC 3: COMMON PROPERTY RESOURCES (2 classes)

A. Basic Theory

*Glenn G. Stevenson, *Common Property Economics*, Cambridge University Press, 1991, Chapters 1, 2, and 3, including appendices.

*C. Ford Runge, "Common Property and Collective Action in Economic Development," in *Making the Commons Work*, ed. by Daniel W. Bromely, Institute for Contemporary Studies Press, 1992.

H. Scott Gordon. "The Economic Theory of a Common-Property Resource: The Fishery" *Journal of Political Economy* 62, 2 (April 1954): 124-142.

Garret Hardin, "The Tragedy of the Commons," *Science*, 162(3859), pp. 1243-1248, 1968.

E. Ostrom, J. Burger, C. Field, R. Norgaard and D. Policansky, "Revisiting the Commons: Local Lessons, Global Challenges," *Science*, 284, pp. 278-282, 1999.

Paul Seabright, "Managing Local Commons: Theoretical Issues in Incentive Design," *Journal of Economic Perspectives*, Fall 1993, Vol. 7, No. 4, pp. 113-134.

B. Game-Theoretic Models

*Partha Dasgupta and Geoffrey Heal, *Economic Theory and Exhaustible Resources*, Cambridge University Press, 1979, Sections 3.4-3.5.

*David Levhari and Leonard Mirman, "The Great Fish War: An Example Using a Dynamic Cournot-Nash Solution," *Bell Journal of Economics* 11:322-334, 1980.

*Charles Mason and Stephen Polasky, "Entry Deterrence in the Commons," *International Economic Review* 35: 507-525, 1994.

Juan-Pablo Montero, "A simple auction mechanism for the optimal allocation of the commons," *American Economic Review*, forthcoming.

Jennifer Reinganum and Nancy Stokey, "Oligopoly Extraction of a Common Property Natural Resource: The Importance of the Period of Commitment in Dynamic Games," *International Economic Review* 26: 161-173, 1985.

Stephen Polasky, N. Tarui, G. Ellis and C. Mason, "Cooperation in the Commons," *Economic Theory*, 2006.

C. Social Norms

*E. Ostrom, "Collective Action and the Evolution of Social Norms," *Journal of Economic Perspectives*, 14(3), pp. 137-158, 2000.

R. Sethi and E. Somanathan, "The Evolution of Social Norms in Common Property Resource Use," *American Economic Review*, 86(4), pp. 766-788, 1996.

TOPIC 4: ENVIRONMENT AND DEVELOPMENT (2 classes)

A. Environmental Kuznets Curve

- *J. Andreoni and A. Levinson, "The simple analytics of the environmental Kuznets curve," *Journal of Public Economics*, 80: 269-286, 2001.
- *Gene Grossman and Alan Krueger, "Economic Growth and the Environment," *Quarterly Journal of Economics*, vol. 110, no. 441, May, 1995.
- *W.T. Harbaugh, A. Levinson and D.M. Wilson, "Reexamining the empirical evidence for an Environmental Kuznets Curve," *Review of Economics and Statistics*, 84(3): 541-551, 2002.
- S. Dasgupta, B. Laplante, H. Wang and D. Wheeler, "Confronting the Environmental Kuznets Curve," *Journal of Economic Perspectives*, 16(1): 147-168, 2002.
- Douglas Holtz-Eakin, Douglas & Thomas Selden, "Stoking the fires? CO2 emissions and economic growth," *Journal of Public Economics*, Elsevier, vol. 57(1), pp. 85-101, May 1995.
- Robert Deacon and Catherine Norman "Does the Environmental Kuznets Curve Describe How Individual Countries Behave?," *Land Economics*, vol. 82(2), pp. 291 - 315, 2006.

B. Natural Resource Curse

- *Jeffrey Sachs and Andrew Warner, "The curse of natural resources" *European Economic Review* 45, pp. 827-33, 2001.
- *R. Torvik, "Natural Resources, Rent Seeking and Welfare" *Journal of Development Economics*, 67, 455-70, 2002.
- Halvor Mehlum, Karl Moene, and Ragnar Torvik, "Institutions and the resource curse," *The Economic Journal* 116 (508), pp. 1-20, 2006.
- Xavier Sala-i-Martin and Arvind Subramanian, "Addressing the Natural Resource Curse: An Illustration from Nigeria," Cambridge Mass., National Bureau of Economic Research, Working Paper 9804, 2003.

TOPIC 5: CLIMATE CHANGE AND SUSTAINABILITY (1 class)

A. Climate Change

- *Kolstad, C.D. and M. Toman, "The Economics of Climate Change Policy" in *The Handbook of Environmental Economics*, Vol. 3, J. Vincent and K.-G. Maler (eds.). Elsevier – North Holland, 2005.
- *Nicholas Stern, "Stern Review on the Economics of Climate Change, Executive Summary," Her Majesty's Treasury, October 2006. Only available online at:
http://www.hm-treasury.gov.uk/media/4/3/Executive_Summary.pdf
- *Martin Weitzman, "The Stern Review on the Economics of Climate Change," *Journal of Economic Literature*, forthcoming.
- Nicholas Stern, *The Economics of Climate Change: The Stern Review*, Cambridge University Press, 2007.
- William D. Nordaus and J. Boyer, *Warming the World: Economic Models of Global Warming*, MIT Press, 2000.
- William Pizer, "The Optimal Choice of Climate Change Policy in the Presence of Uncertainty," *Resource and Energy Economics* 21: 255-287, 1999.

TOPIC 5: CLIMATE CHANGE AND SUSTAINABILITY (cont.)

B. Sustainability

*Oli Tahvonen, "Economic Sustainability and Scarcity of Natural Resources: A Brief Historical Review," Resources for the Future, June 2000. Only available online at:
<http://www.rff.org/Documents/RFF-IB-00-tahvonen.pdf>

*John Pezzey and Michael Toman, "Sustainability and its economic interpretations," in *Scarcity and Growth Revisited*, Simpson et al. (eds.), Resources for the Future Press, 2005.

*Kenneth Arrow, et al., "Are We Consuming Too Much?," *Journal of Economic Perspectives* 18:147-72, 2004.

HSW, Chapter 2

Michael Toman, John Pezzey, Jeffrey Krautkraemer, "Neoclassical Growth Theory and Sustainability," in *The Handbook of Environmental Economics*, ed. by D. Bromley, Basil Blackwell, 1995, pp. 139-165.

Partha Dasgupta, "Sustainable Economic Development in the World of Today's Poor," in *Scarcity and Growth Revisited*, R. David Simpson et al. (eds.), Resources for the Future Press, 2005

Robert Solow, *An Almost Practical Step Toward Sustainability*, Resources for the Future Press, 1998.

OTHER RELEVANT BOOKS

W.J. Baumol and W.E. Oates, *The Theory of Environmental Policy*, 2nd ed., Cambridge University Press, 1988. [Very clear and thorough coverage of what would now be considered traditional topics in externalities and environmental regulation.]

Douglas Bohi and Michael Toman, *Analyzing Nonrenewable Resource Supply*, Resources for the Future, 1984. [A sophisticated, but accessible, development of the theory of resource supply and its implications for empirical analysis; uses a discrete time framework.]

Bromley, Daniel, *The Handbook of Environmental Economics*, Basil Blackwell, 1995. [A very useful compendium of up-to-date survey papers in both environmental and resource economics.]

Patricia Champ, K.J. Boyle, and T.C. Brown, eds. 2003. *A Primer on Nonmarket Valuation*. Kluwer Academic Press: Boston. [A very comprehensive and readable survey of the range of techniques for estimating environmental benefits and their application.]

Jon M. Conrad and C.C. Clark, *Natural Resource Economics: Notes and Problems*, Cambridge Press, 1987.

Partha Dasgupta, *The Control of Resources*, Harvard University Press, 1982. [An insightful but rather idiosyncratic discussion of environmental and renewable resource problems; only assumes calculus.]

Partha Dasgupta and Geoffrey Heal, *Economic Theory and Exhaustible Resources*, Cambridge University Press, 1979. [An excellent, albeit dated, text on natural resource economics. Does not make use of optimal control theory, but is still analytically quite sophisticated and emphasizes economic intuition.]

A.M. Freeman III, *The Measurement of Environmental and Resource Values*, 2nd ed., Resources for the Future Press, 2003. [An excellent, exhaustive treatment of both the theory and application of methods for estimating environmental and resource values.]

Per-Olov Johansson, *Cost-Benefit Analysis of Environmental Change*, Cambridge University Press, 1993. [Succinct exposition of issues that arise in benefit-cost analyses of environmental and resource policies. Primarily devoted to theory but includes a chapter that discusses some very topical applications of benefit-cost analysis.]

Per-Olov Johansson, *The Economic Theory and Measurement of Environmental Benefits*, Cambridge University Press, 1987. [A succinct exposition of the theory of benefits estimation. Not as encyclopedic as AMF and not as up-to-date, but contains a slightly more rigorous development of the basic theory.]

Charles Kolstad, *Environmental Economics*, Oxford University Press, 2000. [Differs from other texts in that it covers a number of interesting topics that are typically ignored; limited use of advanced mathematics.]

Karl-Goran Maler and Jeffrey Vincent (eds.), *Handbook of Environmental Economics*, 3 vols., Elsevier, 2003-2005. [Part of Elsevier's Handbooks in Economics series; compendium of survey articles on numerous facets of environmental economics.]

Philip A. Neher, *Natural Resource Economics*, Cambridge University Press, 1990. [A text designed for readers with a limited economics background. Covers a fair bit of ground at a very leisurely pace. Limited use is made of optimal control theory.]

Roger Perman, M. Common, Y. Ma, J. McGilvray, *Natural Resource and Environmental Economics*, 3rd ed., Addison Wesley, 2003. [Good coverage of both environmental and resource economics with limited use made of math.]

David W. Pearce and R. Kerry Turner, *Economics of Natural Resources and the Environment*, Johns Hopkins University Press, 1990. [A fairly good text that only requires knowledge of calculus; stronger on environmental economics than resource economics.]