

UNIVERSITY OF WATERLOO
Department of Economics
Economics 657 – Environmental Economics
Fall 2009

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Schedule: 12:30-01:50 p.m., T&Th
Room: PAS 2084
Office Hours: 4:00-5:30 p.m., T&Th, or
by appointment

Course Description

This course aims at providing students with the appropriate skills to diagnose the economic causes of environmental problems, and to propose adequate solutions to such problems. The first part of the course, which will last slightly more than half of the term, will emphasize the basics in environmental economics and policy. It will introduce students to the relationship between economic activities and the environment, and review the application of economic tools and theory to solve current environmental problems. The normative foundations of economic analysis will be discussed, including efficiency, intergenerational equity, and sustainability. The design and implementation of environmental policy will be analyzed, including the use of command and control regulation, and market-based instruments. The remainder of the course will focus on some specific and more complex issues in environmental economics. These include global warming and other international environmental problems, corporate environmental behavior, trade and the environment, environmental innovation, etc.

Textbooks

The students' main support for this course will be the following textbook:

Perman, R., Ma, Y., McGilvray, J., and M. Common (2003), *Natural Resource and Environmental Economics*, Third Edition, Pearson / Addison Wesley.

This textbook will be available for purchase at the UW BookStore.

In addition, we will draw some materials from scientific journals - such as the *Journal of Environmental Economics and Management*, *Environmental and Resource Economics*, *Resource and Energy Economics* - and the following references:

- Baumol, W. J. and W. E. Oates (1988), *The Theory of Environmental Policy*, Second Edition, Cambridge University Press.

- Copeland, B. R. and M. S. Taylor (2003), *Trade and the Environment: Theory and Evidence*, Princeton University Press.
- Croci, E. (2005), *The Handbook of Environmental Voluntary Agreements: Design, Implementation and Evaluation Issues*, Springer.
- Kolstad, C. D. (2000), *Environmental Economics*, Oxford University Press.
- Thomson, W. (2001), *A Guide for the Young Economist: Writing and Speaking Effectively about Economics*, The MIT Press.
- Tietenberg, T. H. (2006), *Emissions Trading: Principles and Practice*, Resources for the Future Press.

These additional textbooks, as well as journal articles that are not available online, will be put on reserve at the Dana Porter Library.

Evaluation

Grades in this course will be calculated based on:

- **A midterm exam (30%)**: in-class evaluation **to be held on Thursday November 12th**.
- **A 40-minute presentation** of a scientific paper chosen from the reading list for the selected topics to be covered during the second half of the term **(30%)**.
- **A research paper** on any environmental related issue **(30%)**. You may choose to do a critical literature review, propose an economic model, or conduct an econometric analysis or a case study. Note that the topic of the research paper must be approved in advance by the instructor. Due dates concerning this research paper are as follows:
 - A one page description of the specific question(s) you intend to explore as well as a bibliography of about 10 academic papers: **due on Tuesday October 6th**.
 - A literature review and an outline of the paper: **due on Tuesday November 3rd**.
 - A final draft of the paper: **due on Monday December 1st**.

Please note that no late submissions will be accepted.

- **In-class participation (10%)**. Your in-class participation grade will be based on two types of activities. First, over the first half of the term, every student will be required twice to discuss an academic paper read in preparation to the course (about 10 minutes each paper discussion). Second, these paper discussions as well as the above long presentations will be followed by an open discussion period in which I expect everyone to be an active participant. Therefore, even when you are not scheduled for a paper discussion, you are still expected to do the readings.

Course Outline and Readings

1. Introduction: the Environment and Economics

*Perman et al. (Chapter 1)

Baumol and Oates (Chapter 1)

Kolstad (Chapters 1 & 2)

Deacon, R. et al (1998), “Research Trends and Opportunities in Environmental and Natural Resource Economics”, *Environmental and Resource Economics*, 11:383-97.

Portney, P. (2000), “Environmental Problems and Policy”, *Journal of Economic Perspectives*, 14: 199-206.

2. Intergenerational Equity and Sustainability

*Perman et al. (Chapters 2, 3 & 4)

Brander, J. A. (2007), “Viewpoint: Sustainability: Malthus Revisited?” *Canadian Journal of Economics*, 40(1): 1-38.

Kneese, A. V. and W. D. Schulze (1985), “Ethics and Environmental Economics”, Chapter 5 in A.V. Kneese and J. L. Sweeney (eds), *Handbook of Natural Resource and Energy Economics*, vol I, North-Holland, Amsterdam.

3. Efficiency, Optimality, and Market Failure

*Perman et al. (Chapter 5)

Baumol and Oates (Chapters 1, 2 & 3)

Kolstad (4, 5, 6)

Coase, R. H. (1960), “The problem of Social Cost”, *Journal of Law and Economics*, 3: 1-44.

Dasgupta, P. (1990), “The Environment as a Commodity”, *Oxford Review of Economic Policy*, 6(1): 51-67.

4. Design and Implementation of Environmental Policy

4.1. Goals, principles, and constraints

*Perman et al. (Chapter 6)

Baumol and Oates (Chapters 11 & 17)

Kolstad, C. D. (1987), "Uniformity vs. Differentiation in Regulating Externalities", *Journal of Environmental Economics and Management*, 14(4): 386-99.

Rose-Ackerman, S. (1973), "Effluent Charges: a Critique", *Canadian Journal of Economics*, 6(4): 512-28.

4.2. Instrument Choice and Policy Implementation

*Perman et al. (Chapters 7 & 8)

Baumol and Oates (Chapters 5, 12 & 14)

Kolstad (Chapters 4, 5, 7, 8, 9, & 10)

Duggan, J. and J. Roberts (2002), "Implementing the Efficient Allocation of Pollution", *American Economic Review*, 92(4): 1070-8.

Hahn, R. W. (1989), "Economic Prescriptions for Environmental Problems: How the Patient Followed the Doctor's Orders", *Journal of Economic Perspectives*, 3(2): 95-114.

Harford, J. D. (1987), "Self-Reporting of Pollution and the Firm's Behavior under Imperfectly Enforceable Regulations", *Journal of Environmental Economics and Management*, 14(3): 293-30.

Harrington, W. (1988), "Enforcement Leverage when Penalties are Restricted", *Journal of Public Economics*, 37(1):29-53.

Segerson, K. (1988), "Uncertainty and Incentives for Nonpoint Pollution Control", *Journal of Environmental Economics and Management*, 15(1): 87-98.

Sinclair-Desgagné, B. and E. Gozlan (2003), "A Theory of Environmental Risk Disclosure", *Journal of Environmental Economics and Management*, 45(2): 377 - 93.

Weitzman, M. L. (1974), "Prices versus Quantities", *Review of Economic Studies*, 41(4): 477-91.

5. Economic Valuation of the Environment

*Perman et al. (Chapters 11 and 12)

Kolstad (Chapters 15, 16, 17)

Adamowicz et al. (1994), “Combining Revealed and Stated Preference Methods for Valuing Environmental Amenities,” *Journal of Environmental Economics and Management*, 26(3): 271-92.

Dickie, M. and S. Gerking (1991), “Willingness to Pay for Ozone Control: Inferences from the Demand for Medical Care”, *Journal of Environmental Economics and Management*, 21(1): 1-16.

Hanneman, M. (1991), “Willingness to Pay versus Willingness to Sell: How Much Can They Differ?”, *American Economic Review*, 81(3): 635-47.

Kolstad, C. D. and R. M. Guzman (1999), “Information and the Divergence Between Willingness to Accept and Willingness to Pay”, *Journal of Environmental Economics and Management*, 38(1): 66-80.

6. Selected Topics

6.1. Environmental Policy, Imperfect Market Competition, and the Eco-industry

Canton, J., Soubeyran, A. and H. Stahn (2008), “Optimal Environmental Policy, Vertical Structure and Imperfect Competition”, *Environmental and Resource Economics*, 40(3): 369-82

Conrad, K. and J. Wang (1993), “The Effect of Emission Taxes and Abatement Subsidies on Market Structure”, *International Journal of Industrial Organization*, 11: 499-518.

David, M. and B. Sinclair-Desgagné (2005), “Environmental Regulation and the Eco-Industry”, *Journal of Regulatory Economics*, 28(2): 141-55.

Fujiwara, K. (2009), “Environmental Policies in a Differentiated Oligopoly Revisited”, *Resource and Energy Economics*, 31(3): 239-47.

Katsoulacos, Y. and A. Xepapadeas (1995), “Environmental Policy under Oligopoly with Endogenous Market Structure”, *Scandinavian Journal of Economics*, 97: 411-20.

Lee, S. H. (1999), “Optimal Taxation for Polluting Oligopolists with Endogenous Market Structure”, *Journal of Regulatory Economics*, 15: 293-308.

6.2. Emissions Trading Schemes

Tietenberg (Chapters 1, 2 & 3)

Böhringer, C. and A. Lange (2005), “Economic Implications of Alternative Allocation Schemes for Emission Allowances”, *Scandinavian Journal of Economics*, 107(3): 563–581.

Cason, T. N. (1995), “An Experimental Investigation of Seller Incentives in the EPA’s Emissions Trading Auction”, *American Economic Review*, 85(4): 905-22.

_____ and C. R. Plott (1996), "EPA's New Emissions Trading Mechanism: A Laboratory Evaluation", *Journal of Environmental Economics and Management*, 30(2): 133-60.

6.3. Voluntary Environmental Agreements

Croci (Chapters 1, 5 & 6)

Alberini, A. and K. Segerson (2002), "Assessing Voluntary Programs to Improve Environmental Quality", *Environmental and Resource Economics*, 22: 157- 84.

Arora, S. and T. N. Cason (1995), "An Experiment in Voluntary Environmental Regulation: Participation in EPA's 33/50 Program", *Journal of Environmental Economics and Management*, 28(3): 271- 86.

Lyon, T.P. and J. W. Maxwell (2003), "Self-Regulation, Taxation and Public Voluntary Environmental Agreements", *Journal of Public Economics*, 87: 1453- 86.

Segerson, K. and T. J. Miceli (1998), "Voluntary Environmental Agreements: Good or Bad News for Environmental Protection?", *Journal of Environmental Economics and Management*, 36(2): 109- 30.

6.4. Corporate Environmental Responsibility

Baron, D.P. (2001), "Private Politics, Corporate Social Responsibility, and Integrated Strategy", *Journal of Economics and Management Strategy* 10: 7-45.

_____ (2003), "Private Politics", *Journal of Economics and Management Strategy*, 12: 31-66.

Manasakis, C., Mitrokostas, E., and E. Petrakis (2006), "Corporate Social Responsibility in Oligopoly", Working Paper n°0707, Department of Economics, University of Crete.

Maxwell, J., Lyon, T., and S. Hackett (2000), "Self Regulation and Social Welfare: the Political Economy of Corporate Environmentalism", *Journal of Law and Economics*, 3: 583-617.

6.5. Uncertainty, Irreversibility, and the Precautionary Principle

Barrieu, P. and B. Sinclair-Desgagné (2006), "On Precautionary Policies", *Management Science*, 52(8): 1145-54.

Fisher, A.C. (2000), "Investment under Uncertainty and Option Value in Environmental Economics", *Resource and Energy Economics*, 22:197-204.

Insley, M. (2003), "On the Option to Invest in Pollution Control under a Regime of Tradable Emissions Allowances", *Canadian Journal of Economics*, 35(4): 860-883.

Viscusi, K. (1988), "Irreversible Environmental Investments with Uncertain Benefit Levels," *Journal of Environmental Economics and Management*, 15(2): 147- 57.

6.6. Transboundary Pollution

Barrett, S. (1994), "Self-Enforcing International Environmental Agreements," *Oxford Economic Papers*, 46: 878-94.

_____ (2006), "Kyoto and Beyond: Alternative Approaches to Global Warming", *American Economic Review* 96(2): 22-5.

Candel-Sanchez, F. (2006), "The Externalities Problem of Transboundary and Persistent Pollution", *Journal of Environmental Economics and Management*, 52(1): 517–26

Nordhaus, W. (2006), "After Kyoto: Alternative Mechanisms to Control Global Warming", *American Economic Review*, Papers and Proceedings, 96(2): 31-4.

6.7. Trade, Growth, and the Environment

Copeland and Taylor (Chapters 1, 2, 3, 4, 5 & 7)

Antweiler, W., Copeland, B., and S. Taylor (2001) "Is Free Trade Good for the Environment", *American Economic Review*, 91, 877–907.

Chichilnisky, G. (1994), "North-South Trade and the Global Environment", *American Economic Review*, 84(4): 851-74.

Copeland, B. (2000), "Trade and Environment: Policy Linkages", *Environment and Development Economics*, 5: 405-32.

Lopez, R. and S. Mitra (2000), "Corruption, Pollution and the Kuznets Environment Curve", *Journal of Environmental Economics and Management*, 40(2):137-50.

6.8. Pollution Policy and Environmental Innovation

Benchekroun, H. and D. Claude (2007), "Tax Differentials and the Segmentation of Networks of Cooperation in Oligopoly", *The B.E. Journal of Theoretical Economics Topics*, 7(1), Article 26.

Chiou, J.R. and J.L. Hu (2001), "Environmental Research Joint Ventures under Emission Taxes", *Environmental and Resource Economics*, 21: 129-146.

Denicolò, V. (1999), "Pollution-Reducing Innovations under Taxes or Permits", *Oxford Economic Papers*, 51 (1): 184-99.

Fisher, C., Parry, I. and W. Pizer (2003), "Instrument Choice for Environmental Protection when Technological Innovation is Endogenous", *Journal of Environmental Economics and Management*, 45: 523-45.

Laffont, J.J. and J. Tirole (1996), "Pollution permits and environmental innovation", *Journal of Public Economics*, 62 (1—2): 127- 40.

Poyago-Theotoky, J.A. (2007), “The Organization of R&D and Environmental Policy”, *Journal of Economic Behavior and Organization*, 62(1): 63-75.

Requate, T. (2005), “Timing and Commitment of Environmental Policy, Adoption of New Technology, and Repercussions on R&D”, *Environmental and Resource Economics*, 31: 175-99.

6.9. Tied Foreign Aid and Pollution Abatement

Chao, C-C. and E. S.H. Yu (1999), “Foreign Aid, the Environment, and Welfare”, *Journal of Development Economics*, 59: 553-64.

Hatzipanayotou, P., Lahiri, S. and M. S. Michael (2002), “Can Cross-Border Pollution Reduce Pollution?”, *Canadian Journal of Economics*, 4: 805-18.

Schweinberger, A.G. and A.D. Woodland (2008), “The Short and Long Run Effects of Tied Foreign Aid on Pollution Abatement, Pollution and Employment: A Pilot Model”, *Journal of Environmental Economics and Management*, 55(3): 310-25.

6.10. Economic Growth and the Environment

Grepperud, S. and I. Rasmussen (2004), “A General Equilibrium Assessment of Rebound Effects”, *Energy Economics*, 26: 261-82.

Jorgenson, D.W. and P.J. Wilcoxon (1990), “Environmental Regulation and the U.S. Economic Growth”, *Rand Journal of Economics*, 21: 314-40.

Müller-Fürstenberger, G. and M. Wagner (2007), “Exploring the Environmental Kuznets Hypothesis: Theoretical and Econometric Problems”, *Ecological Economics*, 62:648-60.

Stern, D. and M. Common (2001), “Is There an Environmental Kuznets Curve for Sulfur?”, *Journal of Environmental Economics and Management*, 41: 162-78.

Paudel, K.P. and M.J. Schafer (2009), “The Environmental Kuznets Curve Under a New Framework: The Role of Social Capital in Water Pollution”, *Environmental and Resource Economics*, 42: 265-78.

Note:

- Readings marked with a star (*) must be done in advance of the class.
- Some topics may require more or less emphasis than planned previously. To reflect that need, this outline may be updated as we move through the term.

Missed exams: A student who has been ill (documentation required) and missed the midterm exam MUST advise the instructor within five calendar days so that an arrangement can be made for him/her to write a make-up exam. If the student has failed to write the make-up exam, he/she will automatically receive a grade of 0% for the missed exam.

Remarking of tests: If you feel that your midterm exam was not marked properly, you must advise the instructor within 6 calendar days of the date on which the exam is handed back to the class. A student who submits an exam for remarking should understand that the entire exam will be remarked and that his/her grade may improve, remain unchanged or perhaps even decrease as a result of the remarking process.

Communication with the instructor: When e-mailing the instructor, the subject line of the e-mail must contain ECON 657. Please note that I will not answer any questions regarding course material via e-mail or over the phone. However, I welcome as many questions as possible during class time and during my office hours.

Academic Integrity: in order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility.

Grievance: A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70 - Student Petitions and Grievances, Section 4,
<http://www.adm.uwaterloo.ca/infosec/Policies/policy70.htm>

Discipline: A student is expected to know what constitutes academic integrity, to avoid committing academic offenses, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offense, or who needs help in learning how to avoid offenses (e.g., plagiarism, cheating) or about “rules” for group work/collaboration should seek guidance from the course professor, academic advisor, or the Undergraduate Associate Dean. When misconduct has been found to have occurred, disciplinary penalties will be imposed under Policy 71 – Student Discipline. For information on categories of offenses and types of penalties, students should refer to Policy 71 - Student Discipline,
<http://www.adm.uwaterloo.ca/infosec/Policies/policy71.htm>

Appeals: A student may appeal the finding and/or penalty in a decision made under Policy 70 - Student Petitions and Grievances (other than regarding a petition) or Policy 71 - Student Discipline if a ground for an appeal can be established. Read Policy 72 - Student Appeals,
<http://www.adm.uwaterloo.ca/infosec/Policies/policy72.htm>

Note for students with disabilities: The Office for Persons with Disabilities (OPD), located in NH1132, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with the OPD at the beginning of each academic term.