Johns Hopkins University

Department of Applied Economics

Course Number AS.440.650.51

Environmental and Resource Economics

Fall, 2016

Our economic and social systems are increasingly facing challenging questions regarding the protection of the environment, the management of natural resources and the achievement of economic progress that is in some sense "sustainable" given technological and natural constraints. Decision-makers express growing concerns for these issues, though their approaches to addressing these concerns are not always consistent or well-directed. This course is founded on the conviction that economic reasoning has much to offer (though it is not a panacea) in addressing these challenges. This course is designed to provide the basic conceptual grounding for the use of economics to inform decisions regarding the proper use of the environment and natural resources.

Beginning with the concept of "sustainability", the course develops a framework for an economic assessment of environmental problems including the notion of market failures, policy design issues associated with using alternative economic incentives and instruments such as pollution taxes, environmental subsidies and marketable tradable pollution permits, cost-benefit analysis as applied to environmental issues, and the valuation of environmental resources. The last portion of the course examines principles of the economically efficient management of depletable resources (e.g., fossil fuels) and renewable resources (e.g., fisheries, forests). A number of applied settings are used to demonstrate the principles taught in the course.

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Course Goals & Learning Objectives

The main goal of this course is to introduce students to major theories and policy issues in the field of environmental and resource economics. The course will cover a diverse range of topics: the economics of sustainability, market failures, economic incentives, climate change, environmental and resource valuation techniques, exhaustible resources (e.g., oil and natural gas) and renewable resources (e.g., fisheries). Emphasis is placed on the use of analytical and econometric techniques to assess real world environmental and resource problems.

Upon completion of this course, students will be able to:

- Apply the concepts and tools of economics to conduct independent research on environmental and resource economics topics;
- Analyze the efficacy and efficiency of various policy options;
- Help advise policymakers on environmental and resource-related issues; and
- Demonstrate how economic principles can be applied to improve environmental quality as well as the use of natural resources.

Course Prerequisites. The prerequisite for this course is a graduate level course in microeconomic theory. The course material is presented using economic reasoning and graphical and mathematical analysis. Calculus will be used in the lecture materials. Some case studies involving econometric analysis and the use of spreadsheet tools will be examined in the context of the course.

Readings. The basic course text is **Environmental Economics: In Theory and Practice,** 2nd Edition, 2007, by Hanley, N., Shogren, J. and White, B. Readings from various journals and working papers will be assigned throughout the course. Supplemental readings listed below may be required, time permitting.

Grading. There will be a Mid-term exam and a Final exam. The Mid-term exam will be in class around the mid-point (e.g., the seventh week) of the semester. The Final exam will be in the last week of the semester. Both exams will be given in class. The Mid-term and Final exams are worth 40% of your overall course grade. There will be five homework assignments throughout the semester. Three of the homework assignments are assigned before the Mid-Term Exam. Two of the homework assignments are assigned after the Mid-term exam. The homework assignments are worth 15% of your overall course grade. Class participation is worth 5% of your overall course grade.

SYLLABUS AND READINGS

Unit One: Sustainable Development

Hanley et al., Chapter Two, The Economics of Sustainable Development, pp. 14 – 37

Unit Two: Environmental Kuznets Curve

Yandle, B., Vijayaraghavan, M., Bhattarai, M., "The Environmental Kuznets Curve: A Primer", PERC Research Study, 02–1, May 2002

Levinson, A., Hilton, F., "Factoring the Environmental Kuznets Curve: Evidence from Automotive Lead Emissions", Journal of Environmental Economics and Management, 1998, pp. 126 – 141

Lin, C.Y. and Liscow, Z., "Endogeneity in the Environmental Kuznets Curve: An Instrumental Variables Approach", American Journal of Agricultural Economics, 2012

Unit Three: Property Rights, Coasean Bargaining and Externalities

Randall, A., Chapter Eight, Property Rights, Efficiency, and the Distribution of Income, Resource Economics, 1981, pp. 153 – 163

Hanley et al., Chapter Three, Market Failure: Introduction (3.1) and Markets: Efficient or Otherwise (3.2), pp. 42 – 48; Market Failure: Externalities (3.3), pp. 49 – 57

Unit Four: Non-Exclusivity and Public Goods

Randall, Alan, Chapter Nine, Sources of Inefficiency, Resource Economics, 1981, pp. 164 – 184

Hanley et al., Chapter Three, Market Failure, Non-Rivalry and Public Goods (3.5), pp. 61 – 65 and Concluding Remarks, (3.8), pp. 75 – 79

Hanley, et al., Chapter Three, Market Failure, Non-Exclusion and the Commons (3.4), pp. 57 – 61

Unit Five: Incentive Design

Hanley et al., Chapter Four, Incentive Design, Introduction (4.1), pp. 82 – 85 and Emissions Charges (4.2.1), pp. 85 – 88

Metcalf, G., "A Proposal for a U.S. Carbon Tax Swap: An Equitable Tax Reform to Address Global Climate Change", The Brookings Institute, 2007

Hanley et al., Chapter Four, Incentive Design, Subsidies (4.2.4), pp. 97 – 100

Unit Six: Emission Trading

Pearce, D. and Turner, K., Chapter Eight, Marketable Pollution Permits (8.1-8.4), pp. 110 – 119

Hanley et al., Chapter Five, Incentive Design, Efficiency Properties of Tradable Pollution Permits (5.3), pp. 144 – 147

Chan, G., Stavins, R., Stowe, R., and Sweeney, R., "The SO_2 Allowance Trading Program and the Clean Air Act Amendments of 1990: Reflections on Twenty Years of Policy Innovation", Harvard Environmental Economics Program, 2012

Unit Seven: Climate Change

Hanley et al., Chapter Six, Transboundary Pollution and Global Public Goods, (6.2), Background Issues and a Basic Game, Uniformity of Damages; Uniformity of Mixing, pp. 175 – 179, International Externalities as Games of Strategy (Section 6.2.2) and A Basic Game (Section 6.2.3), pp. 179 – 190, Global Public Good Game (6.3.2), pp. 191 – 193

Hoel, M., "Global Environmental Problems: The Effects of Unilateral Actions by One Country", Journal of Environmental Economics and Management, 1991, pp. 55 – 60

Winebrake, J., et al., Fuel price elasticities in the U.S. combination truck sector, Transportation Research Part D, 2015, pp. 166 – 177

Unit Eight: Environmental Benefits Estimation

Pearce, D. and Turner, K., Chapter Nine, Measuring Environmental Damage I: Total Economic Value, Costs, Benefits, Willingness to Pay and Willingness to Accept, (9.3), 1990, Economics of Natural Resources and the Environment, pp. 125 – 129

Hanley et al., Chapter Eleven, The Theory and Methods for Environmental Valuation, The Divergence in Value Measures, (11.2.2), pp. 327 – 332 and The Hedonic Pricing Method, (11.3.4), pp. 352 – 356

Deaton, J. and Hoehn, J., "Hedonic Analysis of Hazardous Waste Sites in the Presence of Other Urban Disamenities", Environmental Science and Policy, 2004, pp. 499 – 508

Unit Nine: Value of a Life Saved

Hammitt, J., "Valuing Mortality Risk: Theory and Practice", Environmental Science and Technology, 2000

Robinson, L., "How U.S. Government Agencies Value Mortality Risk Reductions", Review of Environmental Economics and Policy, 2007

Unit Ten: Discounting

OMB Guidance, Circular A–4, Regulatory Analysis, September, 2003, Discount Rates, pp. 31 – 37

Boardman, A., et al., Chapter Six, Discounting Benefits and Costs in Future Time Periods, Cost-Benefit Analysis: Concepts and Practice, 3rd, 2006, pp. 131 – 144

Goulder, L., and Williams, R., "The Choice of Discount Rate for Climate Change Policy Evaluation", RFF Discussion Paper, September, 2012

Unit Eleven: Exhaustible Resources

Tietenberg, T. and Lewis, L., Chapter Six, "Depletable Resource Allocation: The Role of Longer Time Horizons, Substitutes, and Extraction Costs", "Introduction" and "A Resource Taxonomy", Environmental and Natural Resource Economics, 9th Edition, 2012, pp. 118 – 122

Pearce and Turner, Chapter Nineteen, Measuring and Mitigating Natural Resource Scarcity, Empirical Evidence of Resource Price Paths, 19.2, Economics of Natural Resources and the Environment, 1990, pp. 290 – 295

Tietenberg, T. and Lewis, L., Chapter Five, Dynamic Efficiency and Sustainable Development, A Two-Period Model, pp. 103 – 107

Tietenberg, T. and Lewis, L., Chapter Seven, The Allocations of Depletable and Renewable Resources: An Overview, The Two-Period Model Revisited, The N-Period Constant-Cost Case, Increasing Marginal Extraction Cost, Exploration and Technological Progress; Appendix: Extension of the Basic Depletable Resource Model, The N-Period, Constant-Cost, No-Substitute Case, Constant Marginal Cost with an Abundant Renewable Substitute, pp. 139 – 154

Perman, et al., Chapter Fifteen, "The Theory of the Optimal Resource Extraction: Non Renewable Resources", "A Non-Renewable Resource Multi-period Model", 15.2, pp. 515 – 520

Pearce and Turner, Chapter Eighteen, Exhaustible Resources, The Effects of Changing Parameters, 18.5, Monopoly and the Rate of Extraction, 18.6, Economics of Natural Resources and the Environment 1990, pp. 278 – 285

Yergin, Daniel, "Stepping on the Gas", Wall Street Journal, April 2nd, 2011

Unit Twelve: Renewable Resources

Tietenberg, T and Lewis, L., Chapter Thirteen, "Common-Pool Resources: Fisheries and Other Commercially Valuable Species", Environmental and Natural Resource Economics, 9th Edition, 2012