

ECONOMICS OF THE ENVIRONMENT AND CLIMATE CHANGE

Professor Neha Khanna

<https://www.binghamton.edu/economics/people/tenured-and-tenure-track-faculty/khanna.html>

Assignments and Grading Policy

- Three homework assignments: 15% (5% each)
- Midterm exam: 35%
- Final exam: 40%
- In-class student presentation: 10%. It is expected that students will volunteer for these presentations; if not presentations will be assigned randomly. Each student must do at least one presentation; more than one presentation per student is likely.

Course Description and Syllabus

This course examines environmental pollution, energy use and climate change as economic phenomena. We will study the theory of externalities, non-market valuation, global oil pricing, and climate change and learn about appropriate public policies to deal with these environmental problems. The course will emphasize rigorous graphical analysis. For the most part, I will adhere to the required reading, though in some cases lectures will extend beyond these. Therefore, I strongly recommend that you take good lecture notes.

The syllabus is tentative and is subject to change.

Required Readings

Textbooks

Tietenberg, Tom and Lynne Lewis, 2015. *Environmental and Natural Resource Economics*, 10th edition, Pearson.

Chapman, Duane, 2000. *Environmental Economics: Theory, Application, and Policy*.

Kahn, James R., 2005. *The Economic Approach to Environmental and Natural Resources*, 3rd edition, Thomson South-Western. (select pages only)

Articles

Aadland D. and A.J. Caplan, 2003. Willingness to Pay for Curbside Recycling with Detection and Mitigation of Hypothetical Bias. *American Journal of Agricultural Economics*, 85(2): 492-502, May.

Arrow K.J, Cline, W.R, Maler, K-G., Munasinghe, M., Squitieri, R., and J.E. Stiglitz, 1996a. Intertemporal Equity, Discounting, and Economic Efficiency. In *Climate Change 1995 – Economic and Social Dimensions of Climate Change*.

Arrow K.J., Cropper M.L., Eads G.C., Hahn R.W., Lave L.B., Noll, R.G., Portney P.R., Russell M., Schmalensee R., Smith V.K., and R.N. Stavins, 1996b. Is There A Role for Benefit-Cost Analysis in Environmental, Health, and Safety Regulation? *Science*, 272: 221-222.

Auffhammer, M., 2018. Quantifying Economic Damages from Climate Change. *Journal of Economic Perspectives*, 32(4): 33-52.

Brajer V., Hall J.V., and F.W. Lurmann, 2011. Valuing Health Effects: The Case of Ozone and Fine Particles in Southern California. *Contemporary Economic Policy*, 29(4): 524-535.

Brown T.C. and R. Gregory, 1999. Why the WTA-WTP Disparity Matters. *Ecological Economics*. 28: 323-335.

Carson, Richard T, 2012. Contingent Valuation: A Practical Alternative when Prices Aren't Available, *Journal of Economic Perspectives*, 26(4): 27-42.

Chapman D. and N. Khanna, 2001. An Economic Analysis of Aspects of Petroleum and Military Security in the Persian Gulf. *Contemporary Economic Policy*, 19(4): 371-381, October.

Chapman D. and N. Khanna, 2006. The Persian Gulf, Global Oil Resources, and International Security. *Contemporary Economic Policy*, 24(4): 507-519, October.

Christianson, Kenny, 2000. *Tompkins County Library Solar Panel Cost-Benefit Analysis*.

Cosgrove B.M., LaFave D.R., Dissanayake S.T.M and M.R. Donohue, 2015. The Economic Impact of Shale Gas Development: A Natural Experiment along the New York / Pennsylvania Border, *Agricultural and Resource Economics Review*, 44(2): 20-39, August. Available online at:

<http://ageconsearch.umn.edu/record/207749/files/ARER2015%2044x2%20202Dissanayake.pdf>

Currie J., Davis L., Greenstone M., and R. Walker, 2015. Environmental Health Risks and Housing Values: Evidence from 1,600 Plant Openings and Closings. *American Economic Review*, 105(2): 678-709.

De La Torre Ugarte D.G., B.B. English and K. Jensen, 2003. Sixty Billion Gallons by 2030: Economic and Agricultural Impacts of Ethanol and Biodiesel Expansion. *American Journal of Agricultural Economics*, 89(5): 1290-1295.

EPA, 1999. *Guideline for Reporting of Daily Air Quality – Air Quality Index*. Office of Air Quality Planning and Standards, EPA-454/R-99-010. July.

Freeman, Myrick A., 2004. Economic Valuation: What and Why? In, Champ, P., K.J. Boyle, and T.C. Brown (eds.), “A Primer on Non-Market Valuation.” Kluwer.

Fullerton and R. Stavins, 1986. How Economists Think About the Environment. *Nature*, 395: 433-444, October 1.

Ghosh, P, *A Simple Economic Analysis of Some Issues Included in the Buenos Aires Plan of Action*, 2000. In, Implementation of the Kyoto Protocol. Asian Development Bank. Sections 4, 5, and 6 only.

Gillingham, K. and J.H. Stock, 2018. The Cost of Reducing Greenhouse Gas Emissions. *Journal of Economic Perspectives*, 32(4): 53-72.

Gopalakrishnan S. and H.A. Klaiber, 2014. Is the Shale Energy Boom a Bust for Nearby Residents? Evidence from Housing Values in Pennsylvania. *American Journal of Agricultural Economics*, 96(1): 43-66.

Hausman, Jerry, 2012. Contingent Valuation: From Dubious to Hopeless, *Journal of Economic Perspectives*, 26(4): 43-56.

Heal, G., 2017. The Economics of the Climate, *Journal of Economic Literature*, 55(3): 1046-1063.

Hsiang, S. and R.E. Kopp, 2018. An Economist’s Guide to Climate Change Science. *Journal of Economic Perspectives*, 32(4): 3-32.

IPCC, 2013. *Climate Change 2013. 5th Assessment Report: Summary for Policymakers*. Available at:
http://www.climatechange2013.org/images/uploads/WGI_AR5_SPM_brochure.pdf

Jellicoe M. and M.S. Delgado, 2015. Quantifying the Effects of Underground Natural Gas Storage on Nearby Residents, *Agricultural and Resource Economics Review*, 44(2): 59-82, August. Available online at:
<http://ageconsearch.umn.edu/record/207740/files/ARER2015%2044x2%2004Delgado.pdf>

Khanna N., 2001. On the Economics of Non-renewable Resources. In, UNESCO’s Encyclopedia of Life Support Systems.

Kling Catherine, Phanuef Daniel and Jinhua Zhao, 2012. From Exxon to BP: Has Some Number Been Better than No Number? *Journal of Economic Perspectives*, 26(4): 3-26.

Krupnick A.J. and H.A. Gordon, 2015. What Experts Say About the Environmental Risks of Shale Gas Development, *Agricultural and Resource Economics Review*, 44(2): 106-119, August. Available online at:

<http://ageconsearch.umn.edu/record/207738/files/ARER2015%2044x2%2006Krupnick.pdf>

Mankiw, Gregory, 2006. One Answer to Global Warming: A New Tax. *New York Times*, September 16.

New York Times. The Hand Turning the Spigot. December 6, 2005.

New York Times. 'Peak Oil' is a Waste of Energy. August 25, 2009.

Nordhaus, W., 2007. To Tax or Not to Tax: Alternative Approaches to Slowing Global Warming. *Review of Environmental Economics and Policy*, 1(1): 26-44, winter.

Roberts M.J, Schlenker W. and J. Eyer, 2013. Agronomic Weather Measures in Econometrics Models of Crop Yields with Implications for Climate Change. *American Journal of Agricultural Economics*, 95(2): 236-243.

Searchinger et al, 2008. Use of U.S. Croplands for Biofuels Increases Greenhouse Gases Through Emissions from Land Use Change. *Science*, 319: 138-140.

Segerson, K., 2015. The Role of Economics in Interdisciplinary Environmental Policy Debates: Opportunities and Challenges. *American Journal of Agricultural Economics*, 97(2): 374-389.

Shue, H., 1993. Subsistence Emissions and Luxury Emissions. *Law and Policy*. 15(1): 39-59.

Summers, L.H., 1991. Memo to the World Bank

Vale, P.M., 2016. The Changing Climate of Climate Change Economics. *Ecological Economics*, 121: 12-19.

Van den Bergh J.C.J.M and W.J.W. Botzen, 2015. Monetary Value of the Social Cost of CO2 Emissions: A Critical Review. *Ecological Economics*, 114: 33-46.

Tentative Syllabus

1. Introduction

- Course outline and class set up
- Thinking about environmental issues
- Putting the environment into economic analysis
- Natural capital

Reading: Tietenberg & Lewis, Chapter 2

2. The “Invisible Hand Principle” and Market Failure

- Review: the invisible hand
- Market failure
- Property rights
- Dynamic efficiency
- **Student presentation: (1) Fullerton and Stavins 1986**

Readings: Tietenberg & Lewis Chapter 2, Chapman (pages 14-18), Fullerton and Stavins (1986)

3. Environmental Externalities and Government Intervention

- Pigou vs. Coase
- The optimal level of pollution
- The problem with command and control
- The logic of economic incentives
- Non uniformly mixing pollutants
- **Student presentations: (2) Segerson, 2015; (3) Mankiw, 2006; (4) Summers, 1991**

Readings: Kahn Chapter 3, Chapman Chapter 1 (pages 13-19, and 73-78), Tietenberg (pages 37-40 and 359-365), Mankiw (2006), Segerson (2015), Lawrence Summer’s memo (1991)

4. Valuing the Environment

- The concept of an economic value
- Discounting revisited
- Techniques for valuing non-market goods
- The importance of values in environmental policy
- **Student presentations: (5) Freeman, 2004; (6) Brown & Gregory, 1999; (7) Kling, Phaneuf & Zhao, 2012; (8) Carson, 2012; (9) Hausman, 2012; Gopalakrishnan & Klaiber, 2014; (10) Aadland & Caplan, 2003**

Readings: Tietenberg & Lewis Chapter 4, Chapman Chapter 3, Brown and Gregory (1999), Freeman (2004), Kling, Phaneuf & Zhao (2012), Carson (2012), Hausman (2012), Gopalakrishnan & Klaiber (2014), Aadland & Caplan (2003)

5. Benefit Cost Analysis, Discounting and Efficiency

- What is benefit cost analysis
- Why discount the future?
- Present value
- Doing a benefit cost calculation
- Some problems with discounting
- Dynamic efficiency
- **Student presentations: (11) Christianson, 2000; (12) Arrow et al (1996b)**

Readings: Tietenberg & Lewis Chapter 3, Chapman Chapter 4, Arrow et al. (1996b), Christianson (2000), Arrow et al. (1996a).

6. Topics in Environmental Economics

(a) Energy and the Environment

- Issues in household energy use – heating, lighting, energy conservation
- World oil – the geology and economics interface, projecting future prices
- OPEC and US energy policy
- **Student presentation: (13) New York Times, 2005 & 2009; (14) Krupnik & Gordon, 2015; (15) Cosgrove et al, 2015; (16) Jellicoe & Delgado, 2015**

Readings: Kahn Chapter 8 (pages 259-275), Kahn Chapter 9 (pages 314-320 and 322-324), Chapman Chapter 7 & 9, Chapman and Khanna (2001), Chapman and Khanna (2006), Khanna (2001 – recommended but not required), Khanna and Chapman (2010), New York Times (2005 & 2009), Krupnick & Gordon (2015), Cosgrove et al (2015), Jellicoe & Delgado (2015)

(b) Climate Change

- Scientific background (**student presentation**)
 - The carbon budget
 - Sources and sinks of greenhouse gases
 - Empirical evidence
 - Economic consequences
 - Response Strategies
- Current international policies (**student presentation**)
- Domestic policy: to tax or to trade?
- International policy: developed vs. developing economies
- Equity Issues in the climate change negotiations
- **Student presentations: (17) latest IPCC Assessment Report Policy Makers Summary, (18) State of international negotiations (IPCC); (19) Heal, 2017; (20) Roberts, Schlenker & Evers, 2013; (21) Hsiang & Kopp, 2018; (22) Auffhammer, 2018; (23) Gillingham & Stock, 2018; (24) Nordhaus, 2007; (25) Searchinger et al, 2008; (26) Vale, 2016; (27) Shue, 1993; (28) Van den Bergh & Botzen, 2015**

Readings: Chapman Chapter 18, IPCC (2013), Ghosh (2000 – sections 4, 5, and 6 only), Mankiw (2006), Nordhaus (2007), Shue (1993), Roberts, Schlenker & Evers (2013), De la Torre Ugarte et al (2003); Vale (2016); Van den Bergh & Botzen (2015); Heal (2017); Hsiang and Kopp (2018); Auffhammer (2018); Gillingham and Stock (2018)

(c) Air Pollution

- Causes and consequences
- US Policy
- **Student presentations: (29) Brajer, Hall & Lurmann, 2011; (30) Currie et al., 2015**

Readings: Chapman Chapter 11, EPA (1999); Brajer, Hall & Lurmann (2011); Currie et al (2015)

(d) Recycling and Waste Disposal

- Why do we generate too much waste?
- The proper disposition of waste
- Waste and recycling

Readings: Kahn Chapter 10 (pages 355-364), Chapman Chapter 10 (section on recycling)