

**Environmental and Energy Economics (PA 388K/ECO 395K)**  
**Syllabus**  
**Spring 2018**

**Course Description**

This is a doctoral course in environmental and energy economics that will provide the foundational knowledge for advanced study in this field. Field courses are typically two semesters in length, so the material we will cover is abbreviated relative to a full-year course. We will cover topics including externalities, valuation of environmental amenities and disamenities, the economics of pollution control and policy instrument choice, climate change, environmental regulation and enforcement, optimal non-renewable natural resource extraction, and open-access resources and commons (e.g., fisheries). The course is a seminar; students will read 5-8 assigned journal articles and/or working papers per week and come to class prepared to discuss them.

**Instructor:**               **Sheila Olmstead**  
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**Prerequisites, Course Requirements and Grading**

All enrolled students are expected to have completed at least one doctoral course in microeconomic theory and one doctoral course in econometrics. Enrolled students must be comfortable reading and discussing papers published in peer-reviewed economics journals. Students' performance will be assessed on the basis of their contributions during weekly class meetings, as well as two written products. Course requirements are as follows:

1. ***Seminar participation*** (30%). The class will be quite small; everyone will need to be prepared to discuss the readings every week, or the course will not be useful for anyone. Your participation grade will be based on the quantity and quality of your weekly contributions to the paper discussions.
2. ***Referee report*** (20%). Choose a working paper in environmental economics, write a referee report, and make a 10-minute discussant presentation. Ideally, this paper will be related to your research proposal (see below). The referee report must include a 1-page letter to the editor that summarizes the paper, evaluates its contributions and merit, and offers advice on whether to reject the paper or invite a revision. The report must also include a separate file containing constructive comments for the author(s).

Good sources for working papers include (but are not limited to):

- a. NBER environment/energy working group  
(<http://www.nber.org/papersbyprog/EEE.html>)
- b. NBER environment/energy summer institute papers  
(<http://www.nber.org/summer-institute/>) - choose a year and select the <eee> line
- c. Resources for the Future (RFF)  
([http://www.rff.org/rff/publications/discussion\\_papers.cfm](http://www.rff.org/rff/publications/discussion_papers.cfm))

3. **Research proposal** (50%). Develop a new research proposal (or add value to an existing proposal) with intermediate products (annotated bibliography, two-page description and motivation of research question, draft literature review section, final proposal that includes a discussion of modeling, data, and econometric issues). Students who are further along in paper development should also include summary statistics, and ideally preliminary results.

### Learning Objectives

Upon completion of the course, doctoral students will be familiar with both the classic foundational papers and models in the environmental economics literature, and with current empirical papers applying these concepts to major environmental policy problems. Along with basic doctoral coursework in micro theory and econometrics, the course will help prepare students to write one or more dissertation papers in environmental economics, and to embark on a research and teaching career in this rapidly growing field.

### Course Materials

There is no formal course textbook, but students may want to purchase the following books from which we will read chapters, and which may be useful for reading and writing papers in the field:

Baumol, William J., and Wallace E. Oates. 1988. *The Theory of Environmental Policy*, 2<sup>nd</sup> edition. Cambridge: Cambridge University Press.

Freeman, A. Myrick III, Joseph A. Herriges, and Catherine L. Kling. *The measurement of environmental and resource values: theory and methods*, 3<sup>rd</sup> ed. Washington, DC: Resources for the Future.

Another book that may be useful as a background text (but from which no readings will be assigned) is:

Phaneuf, Daniel. 2017. *A Course in Environmental Economics: Theory, Policy and Practice*. Cambridge: Cambridge University Press.

## **TENTATIVE COURSE OUTLINE AND READING LIST (SUBJECT TO CHANGE):**

### **Jan. 16: Introduction, Externalities and the Coase Theorem**

Krutilla, John V. 1967. Conservation Reconsidered. *American Economic Review* 57(4): 777-789.

Freeman et al. 2014. *The Measurement of Environmental and Resource Values*. 3<sup>rd</sup> edition. Washington, DC: Resources for the Future. Chapters 1-2, pp. 1-39.

Baumol, William J., and Wallace E. Oates. 1988. *The Theory of Environmental Policy*, 2<sup>nd</sup> edition. Cambridge: Cambridge University Press, Ch. 1-4, Ch. 6-8.

Coase, Ronald H. 1960. The problem of social cost. *Journal of Law and Economics* 3: 1-44.

Demsetz, Harold. 1967. Toward a theory of property rights. *American Economic Review* (P&P) 57: 347-359.

### **Jan. 23, Jan. 30 and Feb. 6 – Estimating the Benefits and Costs of Environmental Policy**

#### ***Pollution, health and productivity***

Greenstone, Michael, and Rema Hanna. 2014. Environmental regulations, air and water pollution, and infant mortality in India. *American Economic Review* 104(10): 3038-2072.

Isen, Adam, Maya Rossin-Slater, and W. Reed Walker. 2017. Every breath you take, every dollar you'll make: The long-term consequences of the Clean Air Act of 1970. *Journal of Political Economy* 125(3): 848-902.

Ebenstein, Avraham, Maoyong Fan, Michael Greenstone, Guojun He, and Maigeng Zhou. 2017. New evidence on the impact of sustained exposure to air pollution on life expectancy from China's Huai River Policy. *Proceedings of the National Academy of Sciences* 114(39): 10384-10389.

#### ***Revealed preference methods: hedonics and recreational demand models***

Freeman et al. 2014. *The Measurement of Environmental and Resource Values*. 3<sup>rd</sup> edition. Washington, DC: Resources for the Future. Chapters 9-11, pp. 269-382.

Muehlenbachs, Lucija A., Elisheba Beia Spiller and Christopher Timmins. 2015. The housing market impacts of shale gas development. *American Economic Review* 105(12): 3633-3659.

Keiser, David, and Joe Shapiro. 2017. Consequences of the Clean Water Act and the Demand for Water Quality. *Quarterly Journal of Economics*, forthcoming.

Timmins, Christopher and Jennifer Murdoch. 2007. A revealed preference approach to the measurement of congestion in travel cost models. *Journal of Environmental Economics and Management* 53(2): 230-249.

Aldy, Joe, and W. Kip Viscusi. 2008. Adjusting the value of a statistical life for Age and Cohort Effects. *Review of Economics and Statistics* 90(3): 573-581.

### ***Stated preference methods***

Freeman et al. 2014. *The Measurement of Environmental and Resource Values*. 3<sup>rd</sup> edition. Washington, DC: Resources for the Future. Chapter 12, pp. 383-418.

Carson, Richard T. et al. 2003. Contingent valuation and lost passive use: damages from the Exxon Valdez Oil Spill. *Environmental and Resource Economics* 25: 257-286.

Adamowicz, Wiktor, Diane Dupont, Alan Krupnick, and Jing Zhang. 2011. Valuation of cancer and microbial disease risk reductions in municipal drinking water. *Journal of Environmental Economics and Management* 61: 213-226.

### ***Estimating regulatory costs***

Greenstone, Michael. The impacts of environmental regulations on industrial activity: evidence from the 1970 and 1977 Clean Air Act Amendments and the Census of Manufacturers. *Journal of Political Economy* 110(6): 1175-1219.

Walker, Reed. 2013. The transitional costs of sectoral reallocation: evidence from the Clean Air Act and the workforce. *Quarterly Journal of Economics* 128(4): 1787-1835.

Jorgensen, Dale W., and Peter J. Wilcoxon. 1990. Environmental regulation and U.S. economic growth. *RAND Journal of Economics* 21: 314-340.

Coffey, Bentley, Patrick A. McLaughlin, and Pietro Peretto. 2016. The cumulative cost of regulations. Mercatus Working Paper. Arlington, VA: Mercatus Center, George Washington University.

Ambec, S., M. A. Cohen, S. Elgie, and P. Lanoie. 2013. The Porter hypothesis at 20: can environmental regulation enhance innovation and competitiveness? *Review of Environmental Economics and Policy* 7(1): 87-102.

**Feb. 13 – Feb. 27: The Economics of Pollution Control and Policy Instrument Choice**

***Market-based policy instruments***

Baumol, William J. 1972. On taxation and the control of externalities. *American Economic Review* 62: 307-322.

Montgomery, W. David. 1972. Markets in licenses and efficient pollution control programs. *Journal of Economic Theory* 5: 395-418.

Helfand, Gloria E. 1991. Standards vs. standards: the effects of different pollution restrictions. *American Economic Review* 81: 622-634.

Hahn, Robert W. 1984. Market power and transferable property rights. *Quarterly Journal of Economics* 99: 753-765.

Stavins, Robert N. 1995. Transactions costs and tradeable permits. *Journal of Environmental Economics and Management* 29: 133-148.

***Instrument choice: uncertainty, pre-existing distortions, and dynamic effects***

Weitzman, Martin. 1974. Prices vs. quantities. *Review of Economic Studies* 41: 477-491.

Pizer, William. 2002. Combining price and quantity controls to mitigate global climate change. *Journal of Public Economics* 85(3): 409-434.

Segerson, Kathleen. 1988. Uncertainty and incentives for nonpoint pollution control. *Journal of Environmental Economics and Management* 15: 87-98.

Goulder, Larry, Ian Parry, Rob Williams, and Dallas Burtraw. 1999. The cost-effectiveness of alternative instruments for environmental protection in a second-best setting. *Journal of Public Economics* 72(3): 329-360.

Popp, David. 2003. Pollution control innovations and the Clean Air Act of 1990. *Journal of Policy Analysis and Management* 22(4): 641-660.

***Applications of market-based approaches***

Muller, Nicholas, and Robert Mendelsohn. 2009. Efficient pollution regulation: getting the prices right. *American Economic Review* 99: 1714-1739.

Schmalensee, Richard, and Robert Stavins. 2013. The SO<sub>2</sub> allowance trading system: the ironic history of a Grand Policy Experiment. *Journal of Economic Perspectives* 27(1): 103-122.

Mansur, Erin T., and Sheila M. Olmstead. 2012. The value of scarce water: measuring the inefficiency of municipal regulations. *Journal of Urban Economics* 71: 332-346.

**March 6: No class meeting**

**March 13: No class meeting – Spring Break**

**March 20, March 27 and April 3: Climate Change – Impacts, Mitigation, and Adaptation**

***Climate change impacts***

Deschenes, Olivier, and Michael Greenstone. 2011. Climate change, mortality and adaptation: evidence from annual fluctuations in weather in the U.S. *American Economic Journal: Applied Economics* 3(4): 152-185.

Mendelsohn, Robert O., William D. Nordhaus, and Daigee Shaw. 1994. The impact of global warming on agriculture: a Ricardian approach. *American Economic Review* 84: 753-771.

Schlenker, Wolfram, and Michael J. Roberts. 2009. Nonlinear temperature effects indicate severe damages to U.S. crop yields under climate change. *Proceedings of the National Academy of Sciences* 106(37): 15594-15598.

Hsiang, Sol, and Amir Jina. 2014. The causal effect of environmental catastrophe on long-run economic growth: evidence from 6,700 cyclones. NBER Working Paper 20352. Cambridge, MA: National Bureau of Economic Research.

Hsiang, Sol, Marshall Burke, and Ted Miguel. 2013. Quantifying the influence of climate on human conflict. *Science* 341(6151): .

***Mitigation: benefits and costs***

Nordhaus, William D. 2016. Revisiting the social cost of carbon. *Proceedings of the National Academy of Sciences* 114(7): 1518-1523.

Greenstone, Michael, Elizabeth Kopits and Ann Wolverton. 2013. Developing a social cost of carbon for U.S. regulatory analysis: a methodology and interpretation. *Review of Environmental Economics and Policy* 7(1): 23-46.

Greenstone, Michael. 2016. Updating the social cost of carbon and valuing climate damages. Video of a presentation at the National Academy of Sciences, Washington, DC. View the video at: <https://vimeo.com/225602579>.

Burke, Marshall, Sol Hsiang and Ted Miguel. 2015. Global nonlinear effect of temperature on economic production. *Nature* 527: 235-239.

Pindyck, Robert S. 2016. The social cost of carbon revisited. NBER Working Paper #22807. Cambridge, MA: National Bureau of Economic Research.

Meng, Kyle C. 2017. Using a free permit rule to forecast the marginal abatement cost of proposed climate policy. *American Economic Review* 107(3): 748-784.

Chen, Yunguang, and Marc Hafstead. 2016. Using a carbon tax to meet U.S. international climate pledges. RFF Discussion Paper #16-48. Washington, DC: Resources for the Future.

### ***Climate adaptation***

Barreca, A., K. Clay, O. Deschenes, M. Greenstone, and J. Shapiro. 2016. Adapting to climate change: the remarkable decline in the U.S. temperature-mortality relationship over the twentieth century. *Journal of Political Economy* 124(1): 105-159.

Burke, Marshall, and Kyle Emerick. 2016. Adaptation to climate change: evidence from U.S. agriculture. *American Economic Journal: Economic Policy* 8(3): 106-140.

Bakkensen, Laura, and Rob Mendelsohn. 2016. Risk and adaptation: evidence from global hurricane damages and fatalities. *Journal of the Association of Environmental and Resource Economists* 3(3): 555-587.

### **April 10: Energy Use and Efficiency**

Allcott and Greenstone. 2012. Is there an energy efficiency gap? *Journal of Economic Perspectives* 26(1): 3-28.

Fowlie, Greenstone and Wolfram. 2015. Do energy efficiency investments deliver? Evidence from the weatherization assistance program. NBER Working Paper 21331. Cambridge, MA: National Bureau of Economic Research.

Gertler, P.J., O. Shelef, C.D. Wolfram, and A. Fuchs. The demand for energy-using assets among the world's risking middle classes. *American Economic Review* 106(6): 1366-1401.

Davis, Lucas W., Alan Fuchs, and Paul Gertler. 2014. Cash for coolers: evaluating a large-scale appliance replacement program in Mexico. *American Economic Journal: Economic Policy* 6(4): 207-238.

Allcott, H., and T. Rodgers. 2014. The short-run and long-run effects of behavioral interventions: experimental evidence from energy conservation. *American Economic Review* 104(10): 3003-3037.

### **April 17: Distributional Effects of Regulation and Environmental Justice**

Banzhaf, Spencer, and Randall Walsh. 2008. Do people vote with their feet? An empirical test of Tiebout's mechanism. *American Economic Review* 98(3): 843-863.

Fowlie, Meredith, Stephen Holland, and Erin Mansur. 2012. What do emissions markets deliver and to whom? Evidence from southern California's NOx trading program. *American Economic Review* 102(2): 965-993.

Fullerton, Don. 2011. Six distributional effects of environmental policy. *Risk Analysis* 31(6): 923-929.

Davis, Lucas, and Chris Knittel. 2016. Are fuel economy standards regressive? NBER Working Paper 22925. Cambridge, MA: National Bureau of Economic Research.

Williams, Rob, Hal Gordon, Dallas Burtraw, Jared Carbone, and Dick Morgenstern. 2014. The initial incidence of a carbon tax across U.S. states. *National Tax Journal* 67(4): 807-30.

Williams, Rob, Hal Gordon, Dallas Burtraw, Jared Carbone, and Dick Morgenstern. 2015. The initial incidence of a carbon tax across income groups. *National Tax Journal* 68(1): 195-214.

### **April 24: Environmental Regulation and Enforcement**

Becker, Gary S. 1968. Crime and punishment: an economic approach. *Journal of Political Economy* 76: 169-217.

Duflo, Esther, Michael Greenstone, Rohini Pande, and Nicholas Ryan. 2013. Truth-telling by third-party auditors and the response of polluting firms: experimental evidence from India. *Quarterly Journal of Economics* 128: 1499-1545.

Holland, Stephen P., Erin T. Mansur, Nicholas Muller, and Andrew Yates. 2016. Damages and expected deaths due to excess NOx emissions from 2009 to 2015 Volkswagen diesel vehicles. *Environmental Science & Technology* 50(3): 1111-1117. (SKIM)

Shimshack, Jay P., and Michael B. Ward. 2005. Regulator reputation, enforcement, and environmental compliance. *Journal of Environmental Economics and Management* 50: 519-540.

Benbear, Lori S., and Sheila M. Olmstead. 2008. The impacts of the "right to know": information disclosure and the violation of drinking water standards. *Journal of Environmental Economics and Management* 56(2): 117-130.

Muehlenbachs, Lucija, Stefan Staubli, and Mark A. Cohen. 2016. The impact of team inspections on enforcement and deterrence. *Journal of the Association of Environmental and Resource Economists* 3(1): 159-204.



Langpap, Christian, and Jay P. Shimshack. 2010. Private citizen suits and public enforcement: substitutes or complements? *Journal of Environmental Economics and Management* 59: 235-249. (OPTIONAL)

### **May 1: Oil and Gas Extraction**

Hotelling, Harold. 1931. The economics of exhaustible resources. *Journal of Political Economy* 39: 137-175.

Anderson, Soren T., Ryan Kellogg, and Steve Salant. 2018. Hotelling under pressure. *Journal of Political Economy*, forthcoming.

Hausman, Catherine, and Ryan Kellogg. 2015. Welfare and distributional impacts of shale gas. *Brookings Papers on Economic Activity* Spring: 71-125.

Newell, Richard G., Brian C. Prest, and Ashley B. Vissing. 2018. Trophy hunting vs. manufacturing energy: the price-responsiveness of shale gas. *Journal of the Association of Environmental and Resource Economists*, forthcoming.

Knittel, Christopher R., Konstantinos Metaxoglou, and Andre Trindade. 2015. Natural gas prices and coal displacement: evidence from electricity markets. NBER Working Paper 21627. Cambridge, MA: National Bureau of Economic Research.

### **May 8: Renewable Resources and Open Access: Fisheries, etc.**

Gordon, H. Scott. 1954. The economic theory of a common property resource: the fishery. *Journal of Political Economy* 62: 124-142.

Clark, Colin. 1973. Profit maximization and the extinction of animal species. *Journal of Political Economy* 81: 950-961. (OPTIONAL)

Costello, Christopher, Steven D. Gaines, and John Lynham. 2008. Can catch shares prevent fisheries collapse? *Science* 321: 1678-1681.

Kremer, Michael, and Charles Morcom. 2000. Elephants. *American Economic Review* 90: 212-234. (OPTIONAL)

Hsiang, Solomon, and Nitin Sekar. 2016. Does legalization reduce black market activity? Evidence from a global ivory experiment and elephant poaching data. NBER Working Paper 22314. Cambridge, MA: National Bureau of Economic Research.

Taylor, M. Scott. 2011. Buffalo hunt: International trade and the virtual extinction of the North American Bison. *American Economic Review* 101: 362-395.

### **Students with Disabilities**

Any student with a documented disability who requires academic accommodations should please contact UT's Services for Students with Disabilities at 512-471-6259 (voice) or 512-410-6644 (video phone) as soon as possible to request an official letter outlining authorized accommodations.

### **Academic Integrity**

Students are expected to respect the LBJ School's standards regarding academic integrity. You owe it to yourself, your fellow students, and the institution to maintain the highest standards of integrity and ethical behavior. A discussion of academic integrity, including definitions of plagiarism and unauthorized collaboration, as well as helpful information on citations, note taking, and paraphrasing, can be found on UT's website at the Office of the Dean of Students web page (<http://deanofstudents.utexas.edu/conduct/>) and the Office of Graduate Studies (<http://www.utexas.edu/ogs/ethics/transcripts/academic.html>). The University has also established disciplinary procedures and penalty guidelines for academic dishonesty, especially Sec. 11.504 in Appendix C of the Institutional Rules on Student Services and Activities section in UT's General Information Catalog.

### **Emergency Evacuation Routes**

The following recommendations regarding emergency evacuation are from the Office of Campus Safety and Security:

- Occupants of buildings on the UT Austin campus are required to evacuate buildings when a fire alarm is activated. Alarm activation or announcement requires exiting and assembling outside.
- Familiarize yourself with all exit doors of each classroom and building you may occupy. Remember that the nearest exit door may not be the one you used when entering the building.
- Students requiring assistance in evacuation shall inform their instructor in writing during the first week of class. In the event of an evacuation, follow the instruction of faculty.
- Do not re-enter a building unless given instructions by the following: the Austin Fire Department, the UT Austin Police Department, or Fire Prevention Services office.

Additional emergency resources are available at the Office of Campus Safety & Security: 512-471-5767, <http://operations.utexas.edu/units/csas/terms.php>. You may access the Behavior Concerns Advice Line (BCAL) at 512-232-5050. A link to information regarding emergency evacuation routes and emergency procedures can be found at: <https://preparedness.utexas.edu/emergency-plans>.

### **Campus Safety and Wellness Resources**

More information on how to sign up for emergency text alerts, contact information for various UT offices, wellness resources, and campus initiatives relating to safety and/or wellness can be found at <https://www.utexas.edu/campus-life/safety-and-security>.

### **Religious Holidays**

By UT Austin policy, you must notify me of your pending absence at least fourteen days prior to the date of observance of a religious holiday. If you must miss a class, an examination, a work

assignment, or a project in order to observe a religious holiday, you will be given an opportunity to complete the missed work within a reasonable time after the absence.

### **Campus Carry**

Since August 2016, UT students with License to Carry (LTC) permits may carry concealed handguns in campus buildings, under Texas' Senate Bill 11 ("Campus Carry"). This law requires that students with LTC conceal handguns while on campus at all times, with no exceptions. The law and UT policy also allow faculty to give oral notice to students that concealed handguns may not be carried in sole-occupant faculty offices. Concealed handguns are not allowed in my office (SRH #3.242), so on days during which you visit my office, please make arrangements to leave handguns off campus. I will make this announcement on the first day of class; I repeat it here in writing as a reminder.