

Syllabus of Economics 436

Environmental Economics

Fall 2015

Hendrik Wolff

Emails¹:

Instructor: hgwolff@uw.edu - Grader: [TBA](#)

Classlist Email: econ436a_au15@uw.edu

Course learning goals and course description: The field of environmental economics examines how environmental resources (e.g. clean air, water, greenhouse gases) are developed and managed. This course aims at equipping students with economic methods and tools to analyze basic environmental issues. This is important because over the next years, policymakers will have to make crucial decisions that will define the future of the environment, transportation and energy. Here are some of the questions and issues that will guide this course: The way we commute, drive and which energy sources the society will use in 30 or 50 years will likely be fundamentally different from today. Will it be the electric car, public transportation, solar energy or natural gas? How will cities adapt to the challenges of increasing urbanization and air pollution? How do firms and households respond to incentives, policy instruments and new technologies? What are the consequences in terms of air quality, health and economic well-being? These are important questions that environmental economists try to answer. This course hence combines theoretical analysis with discussions on specific environmental policies as applied to air pollution, energy, climate change and human health issues. Within these examples, particular topics that will be covered are the concepts of sustainability, microeconomic analysis of environmental regulation, the problem of social cost, policy instrument choice, and estimating costs and benefits of environmental improvements via revealed preferences (i.e. hedonic analysis).

¹ Feel free to email me any time at hgwolff@u.washington.edu. Please note, however, that emails with questions regarding course material very shortly before problem set due dates or exams will NOT be answered. As a general rule: If I reply to an email, I may typically include into the cc of the email all other students of the class too via econ436a_au15@uw.edu. If you don't want that I reply your email to all students, please let me know in your email, otherwise I assume that the email is "forwardable".

Also students can email to the entire class by sending an email to econ436a_au15@uw.edu. Please note you have to use your UW email account to successfully email to econ436a_au15@uw.edu. To avoid spams, all other emails from other accounts (except your UW email account) will NOT arrive at econ436a_au15@uw.edu and will be DELETED.

Class Sessions

There will be two meetings per week, each lasting one hour and fifty minutes. Students are expected to do the suggested readings before the class. Since part of the in class quizzes are at times “open book”, it is suggested that you bring the respective reading material to class. Active participation in the class is encouraged.

Office Hours:

My weekly office hours are Thursdays 10:00-11am, Savery Hall Room 349. Also, feel free to email me at hqwolff@u.washington.edu for any research or urgent course related questions.

Exams:

There will two 100 minute midterm exams. They are preliminary scheduled for :

- (a) **Exam 1:** Nov 3
- (b) **Exam 2:** December 8

Assessment & Evaluation

Problem Sets: 30%

Midterm Test1: 35%

Midterm Test2: 35%

Problem Sets:

- (a) During the quarter you or your study group of max. 3 students will go over several problem sets which will require you to apply the topics we discuss in class and in the readings. In order to solve the problem sets some amount of math (calculus and a limited amount of statistics) is required.
- (b) You are **encouraged** to work in your group on the problem sets. You should write all the names of the group members that participated in your study/problem set on each of the problem sets and your group name.
- (c) Grading of the problem sets: Please write legibly or use a computer. Otherwise no grade will be given.
- (d) All questions on your HW solutions have to be answered in the same sequence as the questions are asked.
- (e) Generally, PSs are due at the beginning of the class on the due date. If you or your group misses the deadline, you'll obtain 0 points for the PS.

Course outline

The outline of the course is as follows:

0. Introduction:

Mathematical Background:

- a) Econometrics: Linear Regression
- b) Optimization using simple calculus

Background Readings:

John Mackenzie: Quick and Dirty Regression Tutorial. Dept. of Applied Economics & Statistics, College of Agriculture and Natural Resources, University of Delaware

Meyer, B. (1995): Natural and Quasi-Experiments in Economics, Journal of Business & Economic Statistics 13, 151-161.

1. Introduction into Environmental Economics

This Introduction is based on Chapter 2 of Barry C. Field and Martha K. Field: Environmental Economics, An Introduction. Sixth Edition, McGraw-Hill Irwin. (prior Editions also work well)

What is “Environmental Economics”?

A first simple model on the “Economy and the Environment”

→ Derivation of 4 Policy Options to reduce impact of Economy on the Environment

→ Quick overview of Implementation of Policy Option: Read Ch. 11 of Kolstad.

4 Categorizations of Environmental Pollutants according to Economic Criteria

First and Second Law of Thermodynamics*

First Law and Strong Sustainability

Solow (Weak) Sustainability

Tragedy of the Commons

Policy Solutions

Privatisation

Pigouvian Taxes

Readings:

Chapter 2 of Barry C. Field and Martha K. Field: Environmental Economics, An Introduction. Fourth Edition, McGraw-Hill Irwin.

Chapter 1 of Nick Hanley, Jason F. Shogren and Ben White: “Environmental Economics, In Theory and Practice”, 1997

Solow, R. M. (1991). Sustainability: An economist's perspective. The Eighteenth J. Seward Johnson Lecture. Woods Hole, MA: Woods Hole Oceanographic Institution.

Hardin, Garrett (1968): The tragedy of the commons. Science Vol. 162, pp. 1243– 1244.

Optional Reading:

- Hardin, Garrett (1998): Extensions of "The Tragedy of the Commons", *Science*, Vol. 280, pp. 682-683.
- Ostrom, Elinor (2010): Beyond Markets and States: Polycentric Governance of Complex Economic Systems, *American Economic Review*, 100(3), pp. 641-72.

2. Efficiency and Markets

Efficiency in the Exchange of Goods and Bads
Indifference Curves
Edgeworth Box

Readings:

Chapter 4 of Kolstad: Environmental Economics, Second Edition

3. Hedonics

Hedonic Price Method
Property Values
Wage Regressions and Value of Statistical Life*

Reading: Charles Kolstad Chapter 7 and 8

4. Climate Change and Quality of Life

Based on: Albouy, D., W. Graf, R. Kellogg and H. Wolff (*forthcoming*): "Climate Amenities, Climate Change and American Quality of Life". Forthcoming at *Journal of the Association of Environmental and Resource Economists*

This research project ties together what we learned so far:

- Hedonics Theory
- Econometrics
- Climate Change

If time permits we may go into one of the following articles:

Lucas Davis: [The Effect of Health Risk on Housing Values: Evidence from a Cancer Cluster](#), *American Economic Review*, 2004, 94(5), 1693-1704.

Lucas Davis: [The Effect of Power Plants on Local Housing Prices and Rents](#), *Review of Economics and Statistics*, 2011, 93(4), 1391-1402.

Arik Levinson, [Valuing public goods using happiness data: The case of air quality](#), *Journal of Public Economics Volume 96, Issues 9–10*, October 2012, Pages 869–880

5. Tools for Energy Conservation

Daylight Saving Time as a tool for energy conservation?

This research is based on:

Kellogg, R. and H. Wolff (2008): “Daylight Time and Energy: Evidence from an Australian Experiment”, *Journal of Environmental Economics and Management*, 56, pp. 207-220, lead article. Recipient of the 2009 JEEM best paper award.

“Does Daylight Saving Time Burn Fat? Time Allocation with Continuous Activities”. Revisions requested at *Economica*, H. Wolff and M. Makino.

Matthew J. Kotchen, Laura E. Grant: Does Daylight Saving Time Save Energy? Evidence from a Natural Experiment in Indiana. *The Review of Economics and Statistics*, November 2011, 93(4): 1172–1185

6. Transportation Economics

a. Traffic Restrictions

i. Low Emission Zone Policies

ii. License Plate Programs

iii. Case studies come from Germany, London and Mexico

b. Vehicle Policies, Gasoline Policies

This presentation draws on the following background literature:

Wolff, H. (2014) “Keep Your Clunker in the Suburb: Low Emission Zones and Adoption of Green Vehicles”, *Economic Journal*, Vol. 124(578), pp. F481-F512.

Wolff, H. (2014) “Value of Time: Speeding Behavior and Gas Prices”, *Journal of Environmental Economics and Management*, Vol. 67(1), pp. 71-88.

Watkins, K. and H. Wolff (2013): Analysis of Heterogeneous Speeding Behavior. *Transportation Research Record: Journal of the Transportation Research Board*, Vol. 2375, pp. 29-36. Doi: 10.3141/2375-04.

Wolff, H. and L. Perry: (2010): “Trends in Clean Air Legislation in Europe: Particulate Matter and Low Emission Zones”. *Review of Environmental Economics and Policy*. 4(2), pp. 293-308.

Wolff, H. (2014): ‘Low Emission Zones’: Incentives to switch to green vehicles produce big health benefits, *Royal Economic Society Media Briefings*.

Wolff, H. (2014): Low-Emission-Zones reduce fine dust pollution in German cities. June 2, 2014, *IZA News Room*.

Lucas Davis: “The Effect of Driving Restrictions on Air Quality in Mexico City” *Journal of Political Economy*, 2008, 116(1), 38-81.

The London Congestion Charge: Jonathan Leape, *The Journal of Economic Perspectives*, Vol. 20, No. 4 (Fall, 2006), pp. 157-176
Published by: American Economic Association Stable URL: <http://www.jstor.org/stable/30033688> .Accessed: 09/05/2012 21:15

Gilles Duranton and Matthew A. Turner: *American Economic Review* 101 (October 2011): 2616–2652
<http://www.aeaweb.org/articles.php?doi=10.1257/aer.101.6.2616>

The Accident Externality from Driving Aaron S. Edlin University of California, Berkeley and National Bureau of Economic Research, Pinar Karaca-Mandic, RAND Corporation, *Journal of Political Economy*, 2006, vol. 114, no. 5

VEHICLE WEIGHT, HIGHWAY SAFETY, AND ENERGY POLICY*, Michael Anderson, University of California, Berkeley, Maximilian Auffhammer, University of California, Berkeley & NBER

Adopting a cleaner technology: The effect of driving restrictions on fleet turnover (with Hernán Barahona and Francisco Gallego) (January, 2015)

Driving restrictions for cleaner vehicles: Lessons on how they work and ways to improve them (with Hernán Barahona and Francisco Gallego) (February, 2015)

The effect of transport policies on car use: Evidence from Latin American cities (with Francisco Gallego and Christian Salas)
Journal of Public Economics. 107, 47-62 (2013).

7. A. Air Pollution and Health

This research discusses the following literature:

“Quantifying Environmental Benefits of Fracking: The Decline of Coal, Air Quality and Health”, Reid Johnsen, Jacob LaRiviere, Nathan Tefft, Hendrik Wolff

Alam, S. and H. Wolff (forthcoming): “Do Pesticide Sellers Make Farmers Sick? Information Sources, Health, and Adoption of Technology in Bangladesh”. In press at Journal of Agricultural and Resource Economics.

Adapting to Climate Change: The Remarkable Decline in the U.S. Temperature-Mortality Relationship over the 20th Century by Alan Barreca, Karen Clay, Olivier Deschenes, Michael Greenstone, Joseph S. Shapiro, NBER Working Paper No. 18692, Issued in January 2013

Deschenes, Olivier and Michael Greenstone (2007): Climate Change, Mortality, and Adaptation: Evidence from Annual Fluctuations in Weather in the US, NBER Working Paper No. 13178

Deschenes, O. and E Moretti (forthcoming): "Extreme Weather Events, Mortality and Migration". Review of Economics and Statistics.

7.B. Environment and Human Capital Formation:

The Long Run Human Capital and Economic Consequences of High-Stakes Examinations

by Victor Lavy, Avraham Ebenstein, Sefi Roth #20647 (CH ED LS)

http://papers.nber.org/papers/W20647?utm_campaign=ntw&utm_medium=email&utm_source=ntw

The Impact of Short Term Exposure to Ambient Air Pollution on Cognitive Performance and Human Capital Formation

by Victor Lavy, Avraham Ebenstein, Sefi Roth #20648 (CH ED EEE LS)

http://papers.nber.org/papers/W20648?utm_campaign=ntw&utm_medium=email&utm_source=ntw

w20662, Prashant Bharadwaj, Joshua Graff Zivin Matthew Gibson Christopher A. Neilson Gray Matters: Fetal Pollution Exposure and Human Capital Formation

w20366 Jessica Wolpaw Reyes: Lead Exposure and Behavior: Effects on Antisocial and Risky Behavior among Children and Adolescents

w19881 Alan Barreca Karen Clay Joel Tarr: Coal, Smoke, and Death: Bituminous Coal and American Home Heating

w19858 Adam Isen Maya Rossin-Slater W. Reed Walker Every Breath You Take - Every Dollar You'll Make: The Long-Term Consequences of the Clean Air Act of 1970

8. Economics of Climate Change

We discuss the following literature

A. Climate Change and Crime

w20598, Marshall Burke, Solomon M. Hsiang, Edward Miguel: Climate and Conflict

B. Climate Change and Health

Deschênes, Olivier, Michael Greenstone, and Jonathan Guryan (2009): Climate Change and Birth Weight, American Economic Review: Papers & Proceedings 2009, 99:2, 211–217

<http://www.aeaweb.org/articles.php?doi=10.1257/aer.99.2.211>

Zivin, Joshua Graff and Matthew Neidell (2010), “Temperature and the Allocation of Time: Implications for Climate Change,” mimeo.

C. Climate Change and Agriculture

Schlenker, W. "[Will U.S. Agriculture Really Benefit from Global Warming? Accounting for Irrigation in the Hedonic Approach.](#)" *American Economic Review*, 95(1), March 2005, p. 395-406. (with W. Michael Hanemann and Anthony C. Fisher).

[Deschenes and Greenstone \(2007\)](#) "The Economic Impacts of Climate Change: Evidence from Agricultural Output and Random Fluctuations in Weather," *American Economic Review*, 97(1), March 2007, p. 354-385.

The Economic Impacts of Climate Change: Evidence from Agricultural Output and Random Fluctuations in Weather: Comment (#26), Anthony C. Fisher, W. Michael Hanemann, Michael J. Roberts and W. Schlenker

The Economic Impacts of Climate Change: Evidence from Agricultural Output and Random Fluctuations in Weather: Reply (#27), Olivier Deschênes and Michael Greenstone

Fuchs, A. and H. Wolff (2011): "Concept and Unintended Consequences of Weather Index Insurance: The Case of Mexico", *American Journal of Agricultural Economics* 93(2), pp. 505–511.

Hayes, T., F. Murtinho and H. Wolff (2015): "An institutional analysis of Payment for Environmental Services on collectively managed lands in Ecuador", *Ecological Economics*, Vol. 118, pp. 81-89.

Alix-Garcia J. and H. Wolff (2014): Payment for Ecosystem Services from Forests. *Annual Review of Resource Economics*, Vol. 6, pp. 361-380.

w20750, Tatyana Deryugina, Solomon M. Hsiang Does the Environment Still Matter? Daily Temperature and Income in the United States

w20716, Matthew E. Kahn, Climate Change Adaptation: Lessons from Urban Economics

9 Policy Instrument using price incentives:

Environmental Policies to Control Pollution:

Command and Control vs.
Environmental Taxes vs.
Cap and Trade vs.
Liability

Pigouvian Fees

Single Polluter single damage
Single Polluter multiple damages
Multiple Polluter and the Equimarginal Principle
Fees Versus Subsidies
Fees and Imperfect Competition

Regulation with Unknown Control Costs

Prices versus Quantities (Environmental Taxes versus Cap and Trade)

Reading and Textbooks

The following book is used to draw background material:

Charles Kolstad: “Environmental Economics”, Oxford University Press, Second Edition.

Please see also the continuously update website

<http://www.econ.ucsb.edu/~kolstad/EEBook/Errata.htm>

for errata.

Also, I will draw some of the material from:

Nick Hanley, Jason F. Shogren and Ben White: “Environmental Economics, In Theory and Practice”, 1997

as well as from

Barry C. Field and Martha K. Field: Environmental Economics, An Introduction. Fourth Edition, McGraw-Hill Irwin.

If you would like to purchase textbooks, then—next to the book by Charles Kolstads—I’d like to recommend the textbook by Field & Field. Kolstads book is more formal than the latter and prepares you well for mastering the mathematical-conceptual part of environmental economics, the homework and the exams. The Fields & Field book is less technical but more intuitive and provides useful applications of the theory to typical environmental problems in practice.

Other readings will consist of journal articles, which summarize key advances in the theoretical literature or provide recent empirical examples of evaluating environmental policies. These articles will be distributed in class.

Overload Policy / Add Codes:

Thank you for your interest in ECON 436 – Environmental Economics. Please email the instructor if you like to have an add code. Add code will also be given the very first day of the course.

Missed Classes:

If you miss a class, it is your responsibility to get a copy of the lecture notes from your class mates. Please note that I do not provide private one to one lectures or summaries via email of what has been covered in class. However, that being said, always feel free to come to my office hours with questions concerning the class material, homework, or your group work research ideas.

Help with Writing

The Odegaard Writing & Research Center offers free, one-to-one help with all aspects of writing at any stage in the writing process -- even if all you have is the assignment sheet. To make an

appointment and browse the center's online resources, please visit:

<http://www.depts.washington.edu/owrc>. Located on the third floor of the Odegaard Library, in room 326, the OWRC is open Sunday from 1:30-6:00pm and Monday-Thursday from 12:00-9:00pm. To make the best use of your time at the OWRC, please bring a copy of your assignment with you, along with notes and course readings to help tutors better understand the writing context. We'll have lots of questions for you, but please know that the OWRC will not proofread papers or talk with you about grades. Instead we're here to support you long-term as a writer by helping you develop good habits and strategies suitable for a variety of writing situations.

And finally two important messages

a) by the UW Human Resources:

Violence awareness and prevention remains an important issue. Please include the following information in the announcement section of your course syllabi:

UW SafeCampus

Preventing violence is everyone's responsibility. If you're concerned, tell someone.

- * Always call 911 if you or others may be in danger.
- * Call 206-685-SAFE (7233) to report non-urgent threats of violence and for referrals to UW counseling and/or safety resources. TTY or VP callers, please call through your preferred relay service.
- * Don't walk alone. Campus safety guards can walk with you on campus after dark. Call Husky NightWalk 206-685-WALK (9255).
- * Stay connected in an emergency with UW Alert. Register your mobile number to receive instant notification of campus emergencies via text and voice messaging. Sign up online at www.washington.edu/alert

For more information visit the SafeCampus website at

[*www.washington.edu/safecampus*](http://www.washington.edu/safecampus).

b) By the department policy on Academic Conduct:

Academic integrity is the cornerstone of the Department's rules for student conduct and evaluation of student learning. Students accused of academic misconduct will be referred directly to the Office of Community Standards and Student Conduct for disciplinary action pursuant to the Student Conduct Code and, if found guilty, will be subject to sanctions. Sanctions range from a disciplinary warning, to academic probation, to immediate dismissal for the Department and the University, depending on the seriousness of the misconduct. Dismissal can be, and has been, applied even for first offenses. Moreover, a grade of zero can be assigned by the instructor for the course.

Please see http://econ.washington.edu/undergrad/academic_conduct/ for all details of the rules.