John F. Kennedy School of Government
Prof. Robert N. Stavins
API-135/Econ 1661

Harvard University
Spring 2020

ECONOMICS OF CLIMATE CHANGE AND ENVIRONMENTAL POLICY
Monday, Wednesday, & Friday, 1:15-2:30 PM, Starr Auditorium (Belfer Room 200)
SYLLABUS

***Nature and Purpose of the Course*:**

This course provides a survey of public policy issues regarding the management of natural resources and the protection of environmental quality, from the perspective of economics. The course covers both conceptual and methodological topics and recent and current applications. A significant portion of the latter half of the course focuses on global climate change policy.

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***Teaching Fellows*:** Daniel Stuart, Ph.D. Student, Public Policy (Head Teaching Fellow)
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***Prerequisites*:** One course in microeconomic theory, or permission of the instructor; an introductory course (such as Social Analysis 10, P-125, API-101, or M-221) is adequate preparation. Students should be familiar with basic economic concepts, such as: supply & demand functions, consumers' surplus, opportunity cost, marginal analysis, and time discounting. It may be helpful to review an introductory microeconomics textbook.

Registration:

IMPORTANT: Unless you are a Kennedy School student you must register for ECON 1661, not API-135; this applies to Harvard undergraduates and all non-Kennedy School graduate students (e.g. HLS, MIT, Tufts, etc).

***Reading Material*:**

There are two required books for the course — one text and one volume of selected readings:

Keohane, Nathaniel, and Sheila Olmstead. *Markets and the Environment. Second Edition.* Washington: Island Press, 2016. [TEXT]

Stavins, Robert N., ed. *Economics of the Environment: Selected Readings, Seventh Edition.* Northampton, Massachusetts: Edward Elgar Publishing, Inc., 2019. [EOE]

Here is a link to two books at the Harvard Coop Bookstore: https://tinyurl.com/300-W20-ECON-1661-1

The Keohane & Olmstead textbook (*Second Edition*) provides a concise yet comprehensive treatment of the topics covered in this course. This book is available for purchase at the Harvard Coop, and is on reserve at the Kennedy School Library, on the ground floor of the Littauer Building**.** Students who would like a more detailed treatment of the material may consider also purchasing *Environmental and Natural Resource Economics* (Thomas Tietenberg & Lynne Lewis). A more rigorous mathematical treatment of the material, beyond the level required for the course, is found in *Environmental Economics* (Charles Kolstad).

The second required book for the course is the ***Seventh*** Edition of *Economics of the Environment*. This is available at the Harvard Coop for purchase, and is on reserve at the Kennedy School Library, on the ground floor of the Littauer Building. Students **should not** purchase previous editions, as many readings covered were not included in previous editions.

Extensive use will be made of other materials, particularly handouts of slides that are used in each class. These additional materials should be downloaded from the course web site and printed in advance of respective classes, because laptops and other electronic devices may not be used during class (see the **NYTimes** for an explanation). A few additional readings found in the reading list below are available for downloading at indicated web sites. The course web site is:

https://canvas.harvard.edu/courses/70676

***Course Requirements and Grading*:**

We will meet for a total of 25 class sessions. There will be: five problem sets (due at the beginning of class on February 19, March 2, March 30, April 13, and April 27); an in-class midterm exam (March 9); and an "in-class" (closed book) final exam during exam period. The final examination is scheduled by the Faculty of Arts and Sciences; the date and time of the exam will be announced by FAS later in the semester. Late problem sets will be penalized by a grade adjustment.

IMPORTANT: Classes are held on most **Mondays, Wednesdays, and some Fridays, 1:15-2:30 PM,** in Starr Auditorium (Belfer-200) at the Harvard Kennedy School. There will be no course meetings during the HKS shopping period. Please see the schedule on the next page. Also, note that some of the Monday or Wednesday classes may be cancelled in advance, and Friday classes added to make up for these. Therefore, enrolled students should be available for the class times on all three days each week.

The Teaching Fellows will conduct optional review sessions on specific topics. These review sessions will generally take place on Fridays in Starr Auditorium.

The exact schedule of classes, with topics and readings, is found on subsequent pages of the syllabus.

Here is a schematic of the schedule of mandatory lectures (bold) and optional sections (italics):

Monday, 1:15-2:30 pm	**Wednesday, 1:15-2:30 pm**	**Friday, 1:15-2:30 pm**
January 27	**January 29**	*Section: January 31*
February 3	**February 5**	*Section: February 7*
February 10	**February 12**	*Section: February 14*
(University Holiday)	**February 19**	*Section: February 21*
February 24	**February 26**	*Section: February 28*
March 2	**March 4**	*Section: March 6*
March 9 (Midterm Exam)		
(Spring Break, March 16-20)		
March 23	**March 25**	**March 27**
March 30	**April 1**	*Section: April 3*
April 6	**April 8**	*Section: April 10*
April 13	**April 15**	*Section: April 17*
April 20	**April 22**	*Section: April 24*
April 27	**April 29**	

Course grading is on the following basis:

Problem Sets	15%
Midterm Exam	35%
Final Exam	50%
	100%

Academic Integrity:

Students are expected to abide by all University policies on academic honesty. While study groups are encouraged, each student must write up and submit his or her own problem sets.

API-135/ECON 1661
ECONOMICS OF CLIMATE CHANGE AND ENVIRONMENTAL POLICY

COURSE OUTLINE

I. INTRODUCTION AND OVERVIEW – *Jan 27*

II. PRINCIPLES AND METHODS

A. Fundamentals
   1. Net Present Value Analysis – *Jan 29 & Feb 3 & 5*
   2. The Costs and Benefits of Environmental Policies - *Feb 10*

B. Environmental Benefit Estimation Methods
   1. Revealed Preference I: Recreation Demand Models - *Feb 12*
   2. Revealed Preference II: Hedonic Pricing & Averting Behavior - *Feb 12*
   3. Stated Preference and Benefit Transfer – *Feb 19 (Problem Set #1 Due)*
   4. Benefits of Morbidity and Mortality Risk Reduction – *Feb 24*

III. NATURAL RESOURCE ECONOMICS AND POLICY

A. Nonrenewable Resources
   1. Optimal Extraction & Use of Nonrenewable Natural Resources – *February 26*
   2. Markets, Market Failure, and Public Policy – *March 2 (Problem Set #2 Due)*

B. Renewable Resources: Common-Property Problems – *March 4*

(Midterm Examination: March 9)

IV. ENVIRONMENTAL ECONOMICS AND POLICY

A. Economics of Pollution Control: An Overview – *March 23, 25 & 27*

B. Local Air Pollution – *March 30 (Problem Set #3 Due)*

C. Acid Rain – *April 1*

D. Global Climate Change

   1. Overview and National Climate Policy – *April 6, 8, & 13 (Problem Set #4 is Due April 13)*

   2. International Climate Policy – *April 15, 20, & 22*

E. Trade, Growth, and the Environment (Professor Frankel) – *April 27 (Problem Set #5 is Due)*

F. Global Climate Change (Concluded) – *April 29*

ECONOMICS OF CLIMATE CHANGE AND ENVIRONMENTAL POLICY

READING LIST

Readings should be completed prior to class sessions, with selections read in the order listed.

TEXT refers to Keohane, Nathaniel, and Sheila Olmstead. *Markets and the Environment. Second Edition.* Washington: Island Press, 2016.

EOE refers to Stavins, Robert N., ed. *Economics of the Environment: Selected Readings, Seventh Edition.* Northampton, Massachusetts: Edward Elgar Publishing, Inc., 2019.

JANUARY 27: INTRODUCTION AND OVERVIEW

TEXT, pp. 11-34, 80-90: Chapter 2 "Economic Efficiency..." and Chapter 5 "Market Failures...", through the "Public Goods" heading

EOE, pp. 2-7, Chapter 1 (Fullerton and Stavins, "How Economists See the Environment," *Nature*, 1998).

EOE, pp. 8-45, Chapter 2 (Coase, "The Problem of Social Cost," *Journal of Law and Economics*, 1960. *OPTIONAL*

JANUARY 29 & FEBRUARY 3 & 5: NET PRESENT VALUE ANALYSIS

TEXT, pp. 35-68: Chapter 3: "The Benefits and Costs..."

EOE, pp. 145-149, Chapter 8 (Arrow, Cropper, Eads, Hahn, Lave, Noll, Portney, Russell, Schmalensee, Smith, and Stavins, "Is There a Role for Benefit-Cost Analysis in Environmental, Health, and Safety Regulation?" *Science*, 1996).

EOE, pp. 150-154, Chapter 9 (Goulder and Stavins, "An Eye on the Future." *Nature*, 2002).

EOE, pp. 155-160, Chapter 10 (Arrow, *et al*., "Determining Benefits and Costs for Future Generations." *Science*, 2013). *OPTIONAL*

EOE, pp. 161-169, Chapter 11 (Gayer and Viscusi, "Resisting Abuses of Benefit-Cost Analysis," *National Affairs*, 2016). *OPTIONAL*

FEBRUARY 10: THE COSTS AND BENEFITS OF ENVIRONMENTAL POLICIES

TEXT, pp. 69-78: Chapter 4, "The Efficiency of Markets"

EOE, pp. 47-71, Chapter 3 (Dechezlepretre, Antoine and Misato Sato. "The Impacts of Environmental Regulations on Competitiveness." *Review of Environmental Economics and Policy* 11(2), 2017).

FEBRUARY 12: REVEALED PREFERENCE I: RECREATION DEMAND MODELS & REVEALED PREFERENCE II: HEDONIC PRICING & AVERTING BEHAVIOR

TEXT, pp. 49-52. "Measuring Benefits," in Chapter 3.

FEBRUARY 19: STATED-PREFERENCE (CONTINGENT VALUATION) AND BENEFIT TRANSFER

***NOTE*: Problem Set #1 is due at beginning of class.**

TEXT, pp. 52, 53, 55. "Measuring Benefits," in Chapter 3.

EOE, pp. 92-107, Chapter 5 (Carson, Richard T. "Contingent Valuation: A Practical Alternative when Prices Aren't Available." *Journal of Economic Perspectives* 26(4) 2012).

EOE, pp. 108-130, Chapter 6 (Kling, Catherine L., Daniel J. Phaneuf and Jinhua Zhao. "From Exxon to BP: Has Some Number Become Better than No Number?" *Journal of Economic Perspectives*. 26(4) 2012). *OPTIONAL*

EOE, pp. 131-143, Chapter 7 (Hausman, Jerry A. "Contingent Valuation: From Dubious to Hopeless." *Journal of Economic Perspectives* 26(4), 2012). *OPTIONAL*

FEBRUARY 24: BENEFITS OF MORBIDITY AND MORTALITY RISK REDUCTION

EOE, pp. 72-91, Chapter 4 (Cameron, "Euthanizing the Value of a Statistical Life." *Review of Environmental Economics and Policy* 4(2), 2010).

FEBRUARY 26: OPTIMAL EXTRACTION & USE OF NONRENEWABLE NATURAL RESOURCES

TEXT, pp. 99-111: Chapter 6, "Managing Stocks…," through "The Hotelling Rule"

EOE, pp. 236-249, Chapter 15 (Solow, Robert M. "The Economics of Resources or the Resources of Economics." *American Economic Review* 64(2), 1974).

EOE, pp. 250-269, Chapter 16 (Covert, Thomas, Michael Greenstone and Christopher R. Knittel. "Will We Ever Stop Using Fossil Fuels?" *Journal of Economic Perspectives* 30(1), 2016). *OPTIONAL*

MARCH 2: MARKETS, MARKET FAILURE, AND PUBLIC POLICY FOR NONRENEWABLES

***NOTE*: Problem Set #2 is due at beginning of class.**

TEXT, pp. 94-97, or NE pp. 111-113: The remainder of Chapter 6.

EOE, pp. 425-432, Chapter 25 (Solow, "Sustainability: An Economist's Perspective." *National Geographic: Research and Exploration*, 1992). *OPTIONAL*

MARCH 4: RENEWABLE RESOURCES & COMMON-PROPERTY PROBLEMS

TEXT, pp. 91-97, 128-137: Chapter 5, "Market Failures…" from the heading "Public Good Provision…" to the end.

EOE, pp. 440-468, Chapter 27 (Stavins, "The Problem of the Commons: Still Unsettled After 100 Years." *American Economic Review* 101(1), 2011). Material related to Part I of this paper is covered in this section of the course. Part II of this paper will be covered during the section on climate change.

EOE, pp. 270-289, Chapter 17 (Olmstead, "The Economics of Managing Scarce Water Resources." *Review of Environmental Economics and Policy 4(2)*, 2010.) *OPTIONAL*

MARCH 9: MIDTERM EXAMINATION

MARCH 23, 25, & 27: ECONOMICS OF POLUTION CONTROL: AN OVERVIEW

TEXT, pp. 139-198: Chapters 8, "Principles of Market-Based…: and 9, "The Case for Market-Based…"

EOE, pp. 171-192, Chapter 12 (Schmalensee, Richard and Robert N. Stavins. "Lessons Learned from Three Decades of Experience with Cap and Trade." *Review of Environmental Economics and Policy* 11(1), 2017).

MARCH 30: LOCAL AIR POLLUTION

***NOTE*: Problem Set #3 is due at beginning of class.**

EOE, pp. 469-489, Chapter 28 (Reinhardt, Stavins, and Vietor, "Corporate Social Responsibility Through an Economic Lens." *Review of Environmental Economics and Policy 2(2)*, 2008). *OPTIONAL*

APRIL 1: ACID RAIN

TEXT, pp. 200-207: Chapter 10, "Market-Based Instruments…" through "Compliance and Enforcement"

EOE, pp. 193-210, Chapter 13 (Schmalensee, Richard and Robert N. Stavins. "The SO_2 Allowance Trading System: The Ironic History of a Grand Policy Experiment." *Journal of Economic Perspectives* 27(1), 2013).

APRIL 6, 8, & 13: GLOBAL CLIMATE CHANGE – OVERVIEW AND NATIONAL POLICY

***NOTE:* Problem Set #4 is due at beginning of class on April 13.**

EOE, pp. 440-468, Chapter 27 (Stavins, "The Problem of the Commons: Still Unsettled After 100 Years." *American Economic Review* 101(1), 2011). Part II is covered here.

EOE, pp. 316-350, Chapter 19 (Aldy, Krupnick, Newell, Parry, and Pizer, "Designing Climate Mitigation Policy." *Journal of Economic Literature* 48(4), 2010).

EOE, pp. 351-355, Chapter 20 (Nordhaus, "Critical Assumptions in the Stern Review on Climate Change." *Science*, 2007).

EOE, pp. 356-360, Chapter 21 (Stern and Taylor, "Climate Change: Risk, Ethics, and the Stern Review." *Science*, 2007).

EOE, pp. 361-383, Chapter 22 (Newell, Richard G., William A. Pizer and Daniel Raimi. "Carbon Markets 15 Years after Kyoto: Lessons Learned, New Challenges." *Journal of Economic Perspectives* 27(1), 2013).

Goulder, Lawrence H. and Robert N. Stavins. "Challenges from State-Federal Interactions in U.S. Climate Change Policy." *American Economic Review Papers and Proceedings* 101(3), 2011.

Greenstone, Michael, Elizabeth Kopits, and Ann Wolverton. "Developing a Social Cost of Carbon for US Regulatory Analysis: A Methodology and Interpretation." *Review of Environmental Economics and Policy* 7(1), 2013.

EOE, pp. 401-423, Chapter 24 (Tol, "The Economic Impacts of Climate Change." *Review of Environmental Economics and Policy 12(1)*, 2018). *OPTIONAL*

EOE, pp. 573-618, Chapter 32 (Gerarden, Newell, and Stavins, "Assessing the Energy-Efficiency Gap." *Journal of Economic Literature 55(4)*, 2017). *OPTIONAL*

APRIL 15, 20 & 22: GLOBAL CLIMATE CHANGE - INTERNATIONAL POLICY

Note: These lectures are interrupted on the 24th by Professor Frankel's lecture on trade.

Stavins, Robert, and Zou Ji, *et al*. "International Cooperation: Agreements and Instruments." *Climate Change 2014: Mitigation*, Intergovernmental Panel on Climate Change, Fifth Assessment Report, Working Group III, Chapter 13. Cambridge, England: Cambridge University Press, 2015. (Read Executive Summary, and skim the rest.)

Olmstead, Sheila M. and Robert N. Stavins. "Three Key Elements of a Post-2012 International Climate Policy Architecture." *Review of Environmental Economics and Policy 6(1), 2012.*

Joseph E. Aldy and Robert N. Stavins. "Climate Negotiators Create an Opportunity for Scholars." *Science*, 2012.

APRIL 27: TRADE, GROWTH, AND THE ENVIRONMENT (Professor Jeffrey Frankel)

NOTE: **Problem Set #5 is due at beginning of class.**

Frankel, Jeffrey. "Global Environmental Policy and Global Trade Policy." Discussion Paper 08-14, Cambridge, Mass.: Harvard Project on International Climate Agreements, October 2008.

APRIL 29: GLOBAL CLIMATE CHANGE – COURSE CONCLUSION

Stavins, Robert N. and Robert C. Stowe, eds. "The Paris Agreement and Beyond: International Climate Change Policy Post-2020." Harvard Project on Climate Agreements, Belfer Center, October 2016. (Read only pages 1-17.)

EOE, pp. 384-400, Chapter 23 (Bodansky, Daniel M., Seth A. Hoedl, Gilbert E. Metcalf, and Robert N. Stavins. "Facilitating Linkage of Climate Policies through the Paris Outcome." *Climate Policy*, 2015).

EOE, pp. 620-640, Chapter 33 (Freeman, "Environmental Policy Since Earth Day I: What Have We Gained?" *Journal of Economic Perspectives 16(1)*, 2002). ***OPTIONAL***

EOE, pp. 641-666, Chapter 34 (Hahn, "The Impact of Economics on Environmental Policy." *Journal of Environmental Economics and Management*, 2000). ***OPTIONAL***