**Environmental and Resource Economics I**
**ECON 9310**
**Spring 2018**
**Section 003 (CRN 21083): Tuesdays and Thursdays, 11:00am-12:15pm, Langdale Hall 305**
**Professor: Garth Heutel**
**gheutel@gsu.edu; (404) 413 0159; Twitter: @GarthHeutel**
**Office: AYS 436**
**Office Hours: Tuesdays and Thursdays, 1:30pm-2:30pm**

Prerequisites: Econ 8100 and Econ 8120

**Catalog Description**
This course is part of a two-course sequence designed to provide students with a working knowledge of the most important models and analytical techniques used in the design of public policy for the management and conservation of natural and environmental systems; environmental benefits measurement; and dynamic models of natural resource management.

**Course Objective**
This class is one of two in the environmental economics PhD field. The classes can be taken in any order.

This class will look at public goods and externalities in the environmental context. It will consider policy tools and other institutions for addressing these effects. It will also consider the problem of estimating people's demand for environmental goods, necessary information for some policy approaches. Finally, it will consider applied evaluation of some policies.

The course's objectives are to introduce you to environmental problems and policy solutions, to teach state-of-the-art econometric procedures for designing and evaluating policies, and to give you practice in the activities of professional research economists.

**Method of Instruction**
ECON 9310 is taught through a combination of lecture, discussion, individual presentations, and examinations.

**Course Materials**
No textbook is required. However, lectures in the first few weeks of the course are based on chapters in *Microeconomic Theory* by Mas-Colell, Whinston, and Green (MWG), *Microeconomics* by Goolsbee, Levitt, and Syverson (GLS), and *Microeconomic Theory: Basic Principles and Extensions* by Nicholson and Snyder (NS), 10th edition. Those books are recommended.

Another recommended book is *A Course in Environmental Economics* by Phaneuf and Requate.

Much of the reading will be journal articles that are available online via the university library. If anything is unavailable via the library, I will make it available on iCollege (please let me know if there is something that you cannot find).

Access to GSU's learning management system, iCollege, (formerly called Desire2Learn (D2L), formerly called Brightspace), is required. It is recommended that students check the iCollege course website at least once between class meetings. Students may set up notifications in iCollege so that they are automatically alerted to new iCollege emails and announcements.

iCollege can send such notifications to an email account of their choice or via text messaging. Student help for iCollege can be found here.
It is critical that students have access to a reliable internet connection throughout the semester, especially because of the required online material. There are multiple computer labs on campus that students may use; see here for more information about locations and hours.

**General Course Outline**
We will cover these topics:
Theoretical foundations of environmental economics
The distribution of the costs of environmental policy
The distribution of the benefits of environmental policy
Environmental policy design
Dynamic models and integrated assessment models
Behavioral economics and the environment

**Grading Policy**
See the table for details on how grades will be determined.

| Component of Grade | Weight | Date |
|---|---|---|
| Midterm exam | 20% | Thursday, February 1st |
| Presentation of published paper | 10% | 2/15, 2/22, 3/1, and 3/6 |
| Referee report of working paper | 10% | Tuesday, March 6th |
| IAM simulation | 10% | Thursday, March 29th |
| Original research paper | 30% | Thursday, April 12th (plus intermediate deadlines) |
| Presentation of original research paper | 10% | 4/12, 4/17, 4/19, 4/26 |
| Attendance and Participation | 10% | Daily |
| Total | 100% | |

The overall course grade is calculated in iCollege, and at any point in the semester, students may see their current overall grade in iCollege. Overall course grades are rounded to the nearest hundredth of a percent (two decimal points). End-of-semester letter grades will be assigned based on the overall course percentage grade according to the following:

- 100.00% and higher: A+
- 94.00% – 99.99%: A
- 90.00% – 93.99%: A–
- 87.00% – 89.99%: B+
- 84.00% – 86.99%: B
- 80.00% – 83.99%: B–
- 77.00% – 79.99%: C+
- 74.00% – 76.99%: C
- 70.00% – 73.99%: C–

- 60.00% – 69.99%: D
- 59.99% and lower: F

Although unlikely, a curve *may* be imposed at the discretion of the instructor. If so, grades will only be curved upwards and never downwards. Thus, a curve will never hurt you and may help you. However, you should not count on there being a curve.

**Midterm Exam**
The midterm exam will be held in class on **Thursday February 1**. It will be on paper, and no notes, books, laptops, cellphones, calculators, or other materials are allowed.

Georgia State University and the Department of Economics have strict expectations of academic integrity. For any exams/quizzes administered online, it is expected that such exams/quizzes be the student's independent, individual work without assistance. Assistance from any persons, notes, books, consultations, groups, electronic devices, previous course exams, or any other sources is strictly prohibited and considered to be a breach of academic honesty. A breach of academic honesty has serious consequences including expulsion. The University's academic honesty policy can be read here: http://deanofstudents.gsu.edu/student-conduct/academic-honesty-policy/

All free-response, essay, and short-answer questions are expected to be written in the student's own words.

There will be absolutely **no make-up** exams. A missed midterm will count as a zero.

**Presentation of Published Paper**
Each student will be assigned to lead the class discussion for 25 minutes of one class period. This amounts to reading the paper assigned for that day, preparing a presentation of the paper, and leading a class discussion. Slides are strongly recommended, and handouts are optional. Each student will choose a paper from the list of readings or of his or her own choosing, subject to the instructor's approval (do not choose one of the required papers with an asterisk next to it). Choose a presentation paper and have it approved by me no later than **January 23rd**. The presentations will be held on **February 15, February 22, March 1, and March 6**. The order of presentations will be determined after the papers have been selected, based on their topics.

**Referee Report of Working Paper**
You must pick a recent (within three years) working paper to review. Excellent places to find such papers include:
- the NBER environment/energy group (http://www.nber.org/papersbyprog/EEE.html)
- the NBER environmental meetings (http://www.nber.org/summer-institute/, choose a year and select the <eee> line
- Resources for the Future (RFF) (http://www.rff.org/rff/Publications/Discussion_Papers.cfm)
- Fondazioni Eni Enrico Mattei (FEEM) (http://www.feem.it/getpage.aspx?id=73&sez=Publications&padre=20&tab=1)

But you are not limited to these. If you are thinking strategically the paper will be related to your own research paper (see below). Choose a working paper and have it approved by me no later than **February 13**. The assignment is due on **Thursday March 6**.

You must provide constructive comments to the author, in an anonymous report about 2-3 pages in length.

I will post sample referee reports. Here are some guides on writing referee reports:
Hamermesh, Daniel S. 1994. "Facts and Myths about Refereeing." *Journal of Economic Perspectives,* 8(1): 153-163.

Berk, Jonathan and Harvey, Campbell R. and Hirshleifer, David A., Preparing a Referee Report: Guidelines and Perspectives (November 21, 2016). Available at SSRN: https://ssrn.com/abstract=2547191 or http://dx.doi.org/10.2139/ssrn.2547191

**IAM Simulation**
You will work with the Matlab code for DICE, an integrated assessment model, to conduct sensitivity analysis over a simulation of optimal climate policy. You will write up a brief 1-2 page summary of your results, plus graphs and/or tables. More details on this assignment will be made available later in the semester. The deadline is **Thursday March 29**.

**Original Research Paper**
A paper on the topic of your choosing is due on **Thursday April 12**. This paper should include a review of the literature relevant to your chosen topic and the groundwork for an original research idea, including a preliminary empirical analysis. The topic should come from environmental economics. For the literature review, define the problem or question, summarize how other papers have addressed the question and how they have answered the question, identify any weaknesses in the literature, and identify gaps or areas of further study. Then, propose a research plan for an original project related to the literature. There is no page length requirement, but between 20-30 pages (12 point font, double spaced, 1-inch margins) is appropriate.

Plan on meeting with me individually at the beginning of February to discuss possible paper topics. Your topic must be approved by me no later than **February 13th**. In class on **February 13th**, each student will present a brief (1-2 minute) outline of his or her paper topic.

Plan on meeting with me individually in the beginning of March (before spring break) to discuss the progress of your paper.

Deadlines for Parts of Research Paper
Details on what is required for each part of the research paper will be provided throughout the semester.
Topic approved and brief outline: **February 13**
6-paragraph introduction and abstract: **February 20**
Literature review: **March 8**
Data description: **March 27**
Empirical methodology: **April 3**
Final paper deadline: **April 12**

**Presentation of Original Research Paper**
On the last several class days and on the final exam date, each student will present (30 minutes) his or her final paper. The order of presentation dates will be assigned at random.

**Attendance and Participation**

Attendance is mandatory. For any class period that is missed, a make-up assignment must be turned in within 48 hours of the class period. The make-up assignment is an essay summarizing the material covered in the class lecture that day. This can be accomplished with a thorough reading of the required paper(s), plus reading some or all of the additional recommended papers. You can also use a classmate's notes, though all of the essay must be in your own words. The minimum length of the essay is 2,000 words. Failure to turn in the make-up assignment after an absence will result in the attendance grade (worth 10% of the overall grade) dropping to zero. Any student with more than two absences must meet with me to discuss their progress in the class.

The University's attendance policy can be read here.

You are expected to participate in class discussions, for which it will be necessary to read the assigned paper(s) ahead of class.

**Twitter**
I occasionally use Twitter to post about news that is relevant for the course. If you want to, you can follow me at @GarthHeutel. Students can also ask and answer course-related questions on Twitter.

**Important Notes:**
1. The course syllabus provides a general plan for the course; deviations may be necessary.
2. All students are responsible for knowing and adhering to GSU's Policy on Academic Honesty as published in Student Code of Conduct Handbook.
3. Your constructive assessment of this course plays an indispensable role in shaping education at Georgia State. Upon completing the course, please take time to fill out the online course evaluation.
4. Students who wish to request accommodation for a disability may do so by registering with the Office of Disability Services. Students may only be accommodated upon issuance by the Office of Disability Services of a signed Accommodation Plan and are responsible for providing a copy of that plan to instructors of all classes in which accommodations are sought.
5. Students who withdraw after the midpoint of each term will not be eligible for a "W" except in cases of Emergency Withdrawal.
    a. Withdrawal Policy: http://advisement.gsu.edu/self-service/policies/withdrawal-policy/
    b. Repeat to Replace Policy: http://advisement.gsu.edu/self-service/policies/repeat-to-replace-policy/
    c. Grade Appeal and Change (including Incomplete Grades) Policy: http://registrar.gsu.edu/academic-records/grading/grade-appeals-and-changes/
6. Important University dates can be found at http://registrar.gsu.edu/registration/semester-calendars-exam-schedules/
7. Georgia State University values diversity and is committed to fostering and maintaining an educational environment which appreciates individual differences in all areas of operation including classroom instruction, texts, and materials. To this end, any actions, practices, or processes by any faculty, staff person, or student that discriminates against or is prejudicial toward any person or group based on race, gender, age, religion, ethnicity, nationality, disability, sexual orientation, or socioeconomic status will not be tolerated.

**Miscellaneous Requests/Advice:**

- No talking to your neighbors during class, even if you are discussing the class. If you have questions raise your hand, or wait to ask them during office hours.
- No cell phone/tablet/texting during class.
- I prefer that you do not use laptops during class. But, if you prefer, you may use them during lectures only to reference the papers that we are discussing.

**Calendar:**
Please complete the assigned reading for each day **before** the day's lecture. Papers denoted with an asterisk are *required* reading; all other readings are recommended.

Calendar is tentative and subject to change throughout the semester.

Tuesday January 9
Edgeworth Exchange Economies
Reading:
MWG 15.B

Thursday January 11
Production in GE models
Reading:
MWG 15.C and 15.D

Tuesday January 16
Fundamental Theorems
Reading:
MWG 16.B-16.D

Thursday January 18
Externalities
Reading:
MWG 11.B
GLS 16.1-16.2

Tuesday January 23
**Deadline for choice of presentation of published paper**
Externalities
Reading:
MWG 11.B
GLS 16.1-16.2

Thursday January 25
Public Goods
Reading:
MWG 11.C
GLS 16.4

Tuesday January 30
Externalities and Public Goods
Reading:
MWG 11.D-11.E

Thursday February 1
**Midterm Exam**

Reading:
*National Bureau of Economic Research, Environmental and Energy Economics Program Report

Tuesday February 6
The Distribution of Costs of Environmental Policy
Reading:
*Fullerton, Don, "Six Distributional Effects of Environmental Policy," Risk Analysis, 31(6), June 2011, 923-929.

*West, Sarah, and Roberton Williams, "Estimates from a Consumer Demand System: Implications for the Incidence of Environmental Taxes," *Journal of Environmental Economics and Management* 47(3), 2004, 535-58

Parry, Ian and Roberton Williams, "What are the Costs of Meeting Distributional Objectives for Climate Policy?" *B.E. Journal of Economic Analysis and Policy, Symposium* 10(2), 2010.

Thursday February 8
The Distribution of Costs of Environmental Policy
Reading:
*Harberger, Arnold, "The Incidence of the Corporation Income Tax," *Journal of Political Economy*, 70, 1962. 215-240.

Fullerton, Don, Gilbert Metcalf, "Tax Incidence," Handbook of Public Economics , Vol. 4, A. Auerbach and M. Feldstein, eds., Amsterdam: Elsevier, 2002, 1787-872 (first 12 pages only)

*Fullerton, Don, and Garth Heutel, "The General Equilibrium Incidence of Environmental Taxes," *Journal of Public Economics* 91(3-4), April 2007, 571-591.

Fullerton, Don, and Garth Heutel, "The General Equilibrium Incidence of Environmental Mandates," *American Economic Journal: Economic Policy*, 2(3), August 2010, 64-89.

Metcalf, G. E., Mathur, A., & Hassett, K. A. (2011). Distributional Impacts in a Comprehensive Climate Policy Package. In The Design and Implementation of US Climate Policy (pp. 21-34). University of Chicago Press.

Araar, Abdelkrim, Yazid Dissou and Jean-Yves Duclos, "Household Incidence of Pollution Control Policies: A Robust Welfare Analysis using General Equilibrium Effects," *Journal of Environmental Economics and Management* 61(2), March 2011, 227-243.

Tuesday February 13
**Deadline for choosing working paper for referee report**
**Deadline for topic of original research paper**
The Distribution of Benefits of Environmental Policy
Reading:

* Davis, Lucas. "The Effect of Power Plants on Local Housing Values and Rents." *Review of Economics and Statistics*, 93(4), November 2011, 1391-1402.

Brooks, N., Sethi, R., "The Distribution of Pollution: Community Characteristics and Exposure to Air Toxics," *Journal of Environmental Economics and Management* 32 (2), February 1997, 233-50

Chay, Kenneth and Michael Greenstone, "Does Air Quality Matter? Evidence from the Housing Market," *Journal of Political Economy*, 103(1), April 2005, 376-424.

Smith, V. Kerry, Holger Sieg, Spencer Banzhaf, and Randall Walsh, "General Equilibrium Benefits for Environmental Improvements: Projected Ozone Reductions under EPA's Prospective Analysis for the Los Angeles Air Basin," *Journal of Environmental Economics and Management* 47(3), May 2004, 559-84

Banzhaf, Spencer and Randall Walsh, "Do People Vote with their Feet? An Empirical Test of Tiebout's Mechanism," *American Economic Review*, 98(3), June 2008, 843-863.

Evans, Mary, Christine Poulos and Kerry Smith, "Who Counts in Evaluating the Effects of Air Pollution Policies on Households? Non-Market Valuation in the Presence of Dependencies."*Journal of Environmental Economics and Management*¸ 62(1), July 2011, 65-79.

Banzhaf, H. Spencer, and Omar Farooque. "Interjurisdictional housing prices and spatial amenities: Which measures of housing prices reflect local public goods?." Regional Science and Urban Economics 43, no. 4 (2013): 635-648.

Coate, Stephen. "Evaluating Durable Good Provision using Housing Prices." NBER Working Paper #18767, February 2013.

Bento, Antonio M. "Equity impacts of environmental policy." Annu. Rev. Resour. Econ. 5, no. 1 (2013): 181-196.

Deschênes, Olivier, Michael Greenstone, and Joseph S. Shapiro. 2017. "Defensive Investments and the Demand for Air Quality: Evidence from the NOx Budget Program." American Economic Review, 107(10): 2958-89.

Thursday February 15
**Student Presentations – Published Paper**

Tuesday February 20
**Deadline for Original Research Paper Introduction and Abstract**
Environmental Policy Design
Reading:
*Weitzman, Martin, "Prices vs. Quantities," *Review of Economic Studies*, 41(4), October 1974, 477-491.

Fell, Harrison, Ian MacKenzie and William Pizer, "Prices versus Quantities versus Bankable Quantities," *Resource and Energy Economics*, 34(4), November 2012, 607-623.

Pizer, William, "Combining Price and Quantity Controls to Mitigate Global Climate Change, " *Journal of Public Economics*, 85(3), September 2002, 409-434.

Aldy, Joseph, Alan Krupnick, Richard Newell, Ian Parry, and William Pizer, "Designing Climate Mitigation Policy," *Journal of Economic Literature*, 48(4), December 2010, 903-934.

Stavins, Robert, "The Problem of the Commons: Still Unsettled after 100 Years," *American Economic Review*, 101(1), February 2011, 81-108.

Anderson, Soren, and James Sallee, "Using Loopholes to Reveal the Marginal Cost of Regulation: The Case of Fuel-Economy Standards," *American Economic Review*, 101(4), June 2011, 1375-1409.

Auffhammer, Maximiliam, and Ryan Kellogg, "Clearing the Air? The Effects of Gasoline Content Regulation on Air Quality," *American Economic Review*, 101(6), October 2011, 2687-2722.

Pezzey, John and Frank Jotzo, "Tax-versus-Trading and Efficient Revenue Recycling as Issues for Greenhouse Gas Abatement," *Journal of Environmental Economics and Management*, 64(2), September 2012, p. 230-236.

Ambec, Stefan, and Jessica Coria. "Prices vs. Quantities with Multiple Pollutants." *Journal of Environmental Economics and Management*, 66(1), July 2013, p. 123-140.

Goulder, Lawrence H., and Andrew R. Schein. "Carbon taxes versus cap and trade: A critical review." Climate Change Economics 4, no. 03 (2013): 1350010.

Pizer, William A., and Brian Prest. Prices versus Quantities with Policy Updating. No. w22379. National Bureau of Economic Research, 2016.

Thursday February 22
**Student Presentations – Published Paper**

Tuesday February 27
Environmental Policy Design
Reading:
*Carlson, Curtis, Dallas Burtraw, Maureen Cropper and Karen Palmer, "Sulfur Dioxide Control by Electric Utilities: What are the Gains from Trade?" *Journal of Political Economy*, 108(6), December 2000, 1292-1326.

*Muller, Nicholas and Robert Mendelsohn, "Efficient Pollution Regulation: Getting the Prices Right," *American Economic Review*, 99(5), December 2009, 1714-1739.

Chan, Gabriel, Robert Stavins, Robert Stowe, Richard Sweeney, "The $SO_2$ Allowance Trading System and the Clean Air Act Amendments of 1990: Reflections on Twenty Years of Policy Innovation," *National Tax Journal*, 65(2), June 2012, 419-452.

Fowlie, Meredith, Stephen Holland, and Erin Mansur, "What Do Emissions Markets Deliver and to Whom? Evidence from Southern California's $NO_X$ Trading Program." *American Economic Review* 102(2), April 2012, 965-993.

Schmalensee, Richard and Robert Stavins, "The $SO_2$ Allowance Trading System: The Ironic History of a Grand Policy Experiment," *Journal of Economic Perspectives*, 27(1), Winter 2013, p. 103-122.

Newell, Richard G., William A. Pizer, and Daniel Raimi. "Carbon Markets: Past, Present, and Future." Annu. Rev. Resour. Econ. 6, no. 1 (2014): 191-215.

Goulder, Lawrence. "Markets for Pollution Allowances: What are the (New) Lessons?" *Journal of Economic Perspectives*, 27(1), Winter 2013, p. 87-102.

Richard Schmalensee, Robert N. Stavins 2017. Lessons Learned from Three Decades of Experience with Cap and Trade. *Rev Environ Econ Policy* 2017; 11 (1): 59-79.

Meng, Kyle C. 2017. "Using a Free Permit Rule to Forecast the Marginal Abatement Cost of Proposed Climate Policy." American Economic Review, 107(3): 748-84.

Thursday March 1
**Student Presentations – Published Paper**

Tuesday March 6
**Deadline for Referee Report**
**Student Presentations – Published Paper**

Thursday March 8
**Deadline for Original Research Paper Literature Review**
No class meeting – individual meetings with professor to discuss original research paper (scheduled TBD)

Tuesday March 13
Spring break; no class

Thursday March 15
Spring break; no class

Tuesday March 20
Dynamic Models and Integrated Assessment Models
Reading:
*Fischer, Carolyn, and Michael Springborn. "Emissions targets and the real business cycle: Intensity targets versus caps or taxes." *Journal of Environmental Economics and Management* 62, no. 3 (2011): 352-366.

Heutel, Garth (2012) "How Should Environmental Policy Respond to Business Cycles? Optimal Policy Under Persistent Productivity Shocks," *Review of Economic Dynamics*, vol. 15, pp. 244-264.

Jerome Adda and Russell Cooper, *Dynamic Economics*, The MIT Press: Cambridge MA. Chapters 2 and 3.

Heutel, Garth, "Plant Vintages, Grandfathering, and Environmental Policy," *Journal of Environmental Economics and Management*, 61(1), January 2011, 36-51.

Bushnell, James B., and Catherine D. Wolfram. "Enforcement of vintage differentiated regulations: The case of new source review." Journal of Environmental Economics and Management 64, no. 2 (2012): 137-152.

Adair, Sarah K., David C. Hoppock, and Jonas J. Monast. "New Source Review and coal plant efficiency gains: How new and forthcoming air regulations affect outcomes." Energy Policy 70 (2014): 183-192.

Dissou, Yazid, and Lilia Karnizova. "Emissions cap or emissions tax? A multi-sector business cycle analysis." *Journal of Environmental Economics and Management*, Vol. 79 (2016): 169-188.

Barrage, Lint. Optimal dynamic carbon taxes in a climate-economy model with distortionary fiscal policy. Working paper, 2016.

Doda, Baran. "Evidence on business cycles and CO2 emissions." *Journal of Macroeconomics* 40 (2014): 214-227.

Khan, Hashmat, Christopher R. Knittel, Konstantinos Metaxoglou, and Maya M. Papineau. How do Carbon Emissions Respond to Business-Cycle Shocks?. Working paperNo. 15-07. Carleton University, Department of Economics, 2015.

Thursday March 22
Dynamic Models and Integrated Assessment Models
Reading:
*William Nordhaus, 2014, "Estimates of the Social Cost of Carbon: Concepts and Results from the DICe-2013R Model and Alternative Approaches," *Journal of the Association of Environmental & Resource Economists* 1(1/2): 273-312.

Nordhaus, William D. A question of balance: Weighing the options on global warming policies. Yale University Press, 2008.

Nordhaus, William D. (2017). Evolution of Assessments of the Economics of Global Warming: Changes in the DICE model, 1992 - 2017. NBER Working Paper #23319.

Nicholas Stern, 2013, "The Structure of Economic Modeling of the Potential Impacts of Climate Change: Grafting Gross Underestimation of Risk onto already Narrow Science Models," *JEL* 51(3): 838-59.

Robert S. Pindyck, 2013, "Climate Change Policy: What Do the Models Tell Us?" *JEL* 51(3): 860-872.

Pindyck, Robert S. "The use and misuse of models for climate policy." *Review of Environmental Economics and Policy* Vol 11 (2017): 100-114.

Martin, Ian WR, and Robert S. Pindyck. "Averting catastrophes: the strange economics of Scylla and Charybdis." *American Economic Review*, Vol 105 (2015).

Michael Greenstone, Elizabeth Kopits, and Ann Wolverton, 2013, "Developing a Social Cost of Carbon for US Regulatory Analysis," *REEP* 7(1): 23-46.

Richard S.J. Tol, 2009, "The Economic Impact of Climate Change," *JEP* 23(2): 29-51.

Botzen, WJ Wouter, and Jeroen CJM van den Bergh. "How sensitive is Nordhaus to Weitzman? Climate policy in DICE with an alternative damage function." *Economics Letters* 117, no. 1 (2012): 372-374.

Kelly, David L., and Charles D. Kolstad. "Bayesian learning, growth, and pollution." *Journal of economic dynamics and control* 23, no. 4 (1999): 491-518.

Kelly, David L., and Zhuo Tan. "Learning and climate feedbacks: Optimal climate insurance and fat tails." *Journal of Environmental Economics and Management* 72 (2015): 98-122.

Kotchen, Matt. "Which Social Cost of Carbon? A Theoretical Perspective." NBER Working Paper #22246 (May 2016).

Tuesday March 27
**Deadline for Original Research Paper Data Description**
Dynamic Models and Integrated Assessment Models
Reading:
Shayegh, Soheil, and Valerie M. Thomas. "Adaptive stochastic integrated assessment modeling of optimal greenhouse gas emission reductions." *Climatic Change* 128, no. 1-2 (2015): 1-15.

Traeger, Christian P. "A 4-stated DICE: quantitatively addressing uncertainty effects in climate change." Environmental and Resource Economics 59, no. 1 (2014): 1-37.

Heutel, Garth, Juan Moreno Cruz, and Soheil Shayegh. "Solar Geoengineering, Uncertainty, and the Price of Carbon." *Journal of Environmental Economics and Management*, Vol. 87 (2018).

Tol, Richard SJ. "Welfare specifications and optimal control of climate change: an application of fund." Energy Economics 24, no. 4 (2002): 367-376.

Ackerman, Frank, and Charles Munitz. "Climate damages in the FUND model: A disaggregated analysis." Ecological Economics 77 (2012): 219-224.

Anthoff, David, and Richard SJ Tol. "Climate policy under fat-tailed risk: an application of FUND." Annals of Operations Research 220, no. 1 (2014): 223-237.

Hwang, In Chang, Frédéric Reynès, and Richard SJ Tol. "Climate policy under fat-tailed risk: An application of DICE." Environmental and Resource Economics 56, no. 3 (2013): 415-436.

Lemoine, Derek, and Christian Traeger. "Watch your step: Optimal policy in a tipping climate." American Economic Journal: Economic Policy 6, no. 1 (2014): 137-166.

Lontzek, Thomas S., Yongyang Cai, Kenneth L. Judd, and Timothy M. Lenton. "Stochastic integrated assessment of climate tipping points indicates the need for strict climate policy." Nature Climate Change (2015).

Hambel, Christoph, Holger Kraft, and Eduardo Schwartz. Optimal carbon abatement in a stochastic equilibrium model with climate change. No. w21044. National Bureau of Economic Research, 2015.

Weitzman, Martin L. "Fat tails and the social cost of carbon." The American Economic Review 104, no. 5 (2014): 544-546.

Lemoine, Derek, and Ivan Rudik. 2017. "Steering the Climate System: Using Inertia to Lower the Cost of Policy." American Economic Review, 107(10): 2947-57.

Thursday March 29
**Deadline for IAM Simulation**
Behavioral Economics and the Environment
Shogren, Jason F. and Laura O. Taylor (2008) "On Behavioral-Environmental Economics," Review of Environmental Economics and Policy, vol. 2, pp. 23-44.

Allcott, Hunt and Sendhil Mullanaithan (2010) "Behavior and Energy Policy," Science, vol. 327, pp. 1204-1205.

*Allcott, Hunt, Sendhil Mullainathan, and Dmitry Taubinsky. "Energy policy with externalities and internalities." Journal of Public Economics 112 (2014): 72-88.

Tsvetanov, Tsvetan, and Kathleen Segerson. "Re-evaluating the role of energy efficiency standards: A behavioral economics approach." Journal of Environmental Economics and Management 66, no. 2 (2013): 347-363.

Sallee, James (2014) "Rational Inattention and Energy Efficiency," Journal of Law and Economics, vol. 57, no. 3, article 7.

Jacobsen, Mark, Jacob S. LaRiviere and Michael K. Price (2014) "Public Good Provision in the Presence of Green Preferences," working paper, NBER.

Andreoni, James (1990) "Impure Altruism and Donations to Public Goods: A Theory of Warm-Glow Giving," The Economic Journal, vol. 97, pp. 1447-1458.

Becker, Gary (1974) "A Theory of Social Interactions," Journal of Political Economy, vol. 82, pp. 1063-1093.

Charness, Gary and Matthew Rabin (2002) "Understanding Social Preferences with Simple Tests," Quarterly Journal of Economics, vol. 117, pp. 817-869.

Rabin, Matthew and Ted O'Donoghue (1999) "Doing It Now or Later," American Economic Review, vol. 89, pp. 103-124.

Laibson, David (1997) "Golden Eggs and Hyperbolic Discounting," Quarterly Journal of Economics, vol. 112, pp. 443-478.

O'Donoghue, Ted, and Matthew Rabin. "Optimal sin taxes." Journal of Public Economics 90, no. 10 (2006): 1825-1849.

Kahneman, Daniel and Amos Tversky (1979) "Prospect Theory: An Analysis of Decision Under Risk," Econometrica, vol. 47, pp. 263-291

Heutel, Garth. "Optimal Policy Instruments for Externality-Producing Durable Goods under Present Bias." Journal of Environmental Economics and Management (2015).

Kahneman, Daniel, and Robert Sugden. "Experienced utility as a standard of policy evaluation." Environmental and resource economics 32, no. 1 (2005): 161-181.

Galle, Brian D., The Problem of Intra-Personal Cost (April 20, 2016). Available at SSRN: http://ssrn.com/abstract=2767868

Tuesday April 3
**Deadline for Original Research Paper Empirical Methodology**
No class meeting – individual meetings with professor to discuss original research paper (scheduled TBD)

Thursday April 5
No class meeting – individual meetings with professor to discuss original research paper (scheduled TBD)

Tuesday April 10
Behavioral Economics and the Environment
*Ferraro, Paul J. and Michael K. Price (2013) "Using Non-Pecuniary Strategies to Influence Behavior: Evidence from a Large-Scale Field Experiment." Review of Economics and Statistics, vol. 95, pp. 64-73.

*Allcott, Hunt (2011) "Social Norms and Energy Conservation" Journal of Public Economics, vol. 95, pp. 1082-1095.

Dolan, Paul and Robert Metcalfe (2013) "Neighbors, Knowledge, and Nuggets: Two Natural Field Experiments on the Role of Incentives on Energy Conservation," LSE CEP Discussion Paper No. 1222.

Allcott, Hunt and Todd Rogers (2012) "The Short Run and Long-Run Effects of Behavioral Interventions: Experimental Evidence from Energy Conservations," NBER Working Paper 18492.

Bennear, Lori, Alessandro Tarozzi, Alexander Pfaff, H.B. Soumya, Kazi M. Ahmed, and Alexander van Geen (2010) "Bright Lines, Risk Beliefs, and Risk Avoidance: Evidence from a Randomized Intervention in Bangladesh," working paper Duke University.

Newell, Richard G., and Juha Siikam. "Nudging Energy Efficiency Behavior: The Role of Information Labels." Journal of the Association of Environmental and Resource Economists 1, no. 4 (2014): 555-598.

Ayres, Ian, Sophie Raseman, and Alice Shih. "Evidence from two large field experiments that peer comparison feedback can reduce residential energy usage." Journal of Law, Economics, and Organization 29, no. 5 (2013): 992-1022.

Costa, Dora L., and Matthew E. Kahn. "Energy conservation “nudges” and environmentalist ideology: evidence from a randomized residential electricity field experiment." Journal of the European Economic Association 11, no. 3 (2013): 680-702.

Bradford, David, Charles Courtemanche, Garth Heutel, Patrick McAlvanah, and Christopher Ruhm. "Time Preferences and Consumer Behavior." No. w20320. National Bureau of Economic Research, 2014.

Harding, Matthew and Alice Hsiaw (2012) “Goal Setting and Energy Efficiency.” working paper, Stanford University.

Herberich, David, John A. List, and Michael K. Price (2011) “How Many Economists Does it Take To Change a Light Bulb? A Natural Field Experiment on Technology Adoption,” Working Paper, University of Chicago, Department of Economics.

Thursday April 12
**Deadline for Original Research Paper Final Paper**
**Student Presentations – Original Research Paper**

Tuesday April 17
**Student Presentations – Original Research Paper**

Thursday April 19
**Student Presentations – Original Research Paper**

Tuesday April 24
No class

Thursday April 26
(Final Exam period – 10:45am – 1:15pm)
**Student Presentations – Original Research Paper**