

Environ 235: Environmental Economics, Policy, and Justice

Winter 2023 Course Syllabus
(Version: March 29th, 2023)

Logistics

Lecture: T/Th 1:00-2:20 p.m. (Dana 1028)

Professor: Samuel Stolper (sstolper@umich.edu)

Graduate Student Instructor: Tim Arvan (timarvan@umich.edu)

Website: <https://umich.instructure.com/courses/422636>

Office Hours: Sam: T 4:00-5:00pm, Th 2:30-3:30pm (Dana 3006)

Tim: M 1:30-2:30pm, W 3:30-4:30pm (Haven Hall 7726)

About this course

In the age of climate change, environmental problems are as large and urgent as ever before. Rising temperatures induce poverty and death, and island nations face existential threats. At the same time, local air and water pollution problems persist in cities from Delhi to Detroit, often disproportionately burdening the relative poor and people of color. Economic analysis of environmental problems is valuable for a number of reasons: economics provides a framework for understanding incentives for human behavior; it facilitates the measurement of costs and benefits; and it is a language to which people listen, from the highest levels of government down to the individual household. In this course, we will use the lens of economics to characterize environmental problems and the theoretical and empirical impacts of possible solutions. We will begin by fleshing out some foundational economic and environmental concepts. From there we will start to model and compare some of the policy types at our disposal. Then we will focus in on climate change, before spending the remainder of the course on a number of different applications and sectors – such as electricity, transportation, food, and water – that are central to meeting our climate and environmental challenges.

Prerequisites: none.

Teaching goals and class format

I have designed this course with several teaching goals in mind. Most importantly, I aim for students to:

- Become knowledge experts in the area of environmental policy
- Develop a versatile economic intuition, for use in any environmental professional setting
- Become more comfortable with quantitative thinking and analysis

This course meets on Tuesdays and Thursdays from 1:00 to 2:20pm in the Dana building, room 1028. Class time will be primarily lecture and discussion, with semi-regular breakout activities. About two thirds of the way through the semester, we will begin playing a multi-week, team-based game simulating a wholesale electricity market. Students complete regular readings, periodic quantitative and written assignments, and two quizzes through the course of the semester. Course materials are maintained on the Canvas course website.

Assignments and grading

Assignments give you practice with quantitative analysis and professional writing, as well as illustrating the concepts we learn in this course. Your course grade will be determined according to your performance in these assignments, two quizzes, and participation in course activities. Graded activities are listed below, with numbers in parentheses denoting weights for each activity in the calculation of your final grade.

- Participation (10%): Engagement in the course in keeping with what is outlined below under “Attendance and participation”.
- Problem sets (20%): Three problem sets combining graphical/mathematical analysis and qualitative assessment in different settings.
- Opinion (10%): A short written piece making an argument to a wide, non-expert audience.
- Quizzes (30%): Two in-class quizzes testing your understanding of the relevant unit’s course material.
- Electricity game memo (10%): A team writeup of your strategy and experience with the electricity game.
- Policy paper (20%): A 1,000-1,500 word “brief” arguing in favor of a policy of your choosing.

Problem sets and written assignments are due at the beginning of class, unless otherwise stipulated. They should be submitted via Canvas (you are very welcome to handwrite your answers and scan an image of them for submission). Unexcused late submissions will be

penalized 5 percentage-points per day, but please let us if you are having trouble keeping up with deadlines; we will try to be flexible!

I plan to assign final grades according to the following rubric:

- A+: 97-100; A: 93-96; A-: 90-92
- B+: 87-89; B: 80-86; B-: 70-80
- C+: 65-69; C: 60-64; C-:55-60
- D: 50-55
- F: below 50

I may adjust final grades upwards, if assignments turn out to have been harder than expected. I will not adjust final grades downwards.

Readings

I have recorded (or will record) about a dozen mini video lectures, which you will be assigned to view throughout the semester but especially earlier on. I aim for these lectures to be 10-15 minutes each, and you may be assigned 1 or 2 (or 0) of them for a given class. They will focus on economic modeling of and measurement in relevant markets, policies, etc.

You will also be assigned 1-2 other pieces of media per class – mostly articles from news sources, blogs, and academic journals, as well as a few podcast episodes. I purposefully assign modest reading loads, to encourage you each to do all of the readings. I also have added optional readings to some classes, for those with further interest in what I think is interesting/important with regard to a given topic.

During the first unit of the course, there are several optional readings from a textbook – Nathaniel O. Keohane and Sheila M. Olmstead, Markets and the Environment, 2nd Edition (2016). These readings provide helpful context and support for the content of my earlier lectures. The textbook is available in digital form from the University of Michigan library system, at <<https://ebookcentral-proquest-com.proxy.lib.umich.edu/lib/umichigan/detail.action?docID=4787531>>.

A few of the assigned readings come from the blog run by the Energy Institute at Haas, based at the University of California Berkeley, Haas School of Business. There is an excellent group of environmental and energy economists at Berkeley, and I encourage you to peruse the blog (<https://energyathaas.wordpress.com/>) beyond the assigned readings.

Other course policies

Attendance and participation: I expect you to attend class and to enter the classroom on time. However, you may miss up to three class meetings without excuse, and we will be

understanding about conflicts or other challenges to attendance, so please talk to us if you need to miss a class. I expect you to participate in breakout sessions, speak or chat in the larger group at least occasionally, and show respect for everyone else in the course.

Device policy: Laptops, tablets, and phones are not generally allowed open in class. While they can certainly aid in your learning in a variety of ways, they also inevitably draw your attention away from class lecture and discussion. If you feel that you need a device to learn, please write or come talk to me about it.

Office hours: Office hours are an opportunity for you to come talk to us about any number of things, including: questions about any element of the course; careers; environmental issues in general; or your well-being at school or otherwise. The first page of this syllabus lists Tim's and my tentative office hours schedule. If at any point you would like to meet with us but cannot make any of the regular office hours, just email us!

Correspondence: We will try to get back to your emails within 24 hours. Please note ENV 235 in your subject line. If you plan on asking multiple involved questions, please come to office hours or schedule a meeting.

Grade grievances: You must submit requests for a re-grade within one week of receiving the original grade. You must also attach the original graded item and provide a clear written explanation of what you would like to be re-evaluated and why. Your adjusted grade may be higher or lower than the original.

Work ethic: Do not plagiarize. If you paraphrase or copy work that is not your own, you must reference that work. The risk of plagiarizing is not worth the reward. More generally, cheating and academic dishonesty in any form will not be tolerated. Any student found to have cheated or behaved unethically or dishonestly will be given a zero on the assignment or exam involved and referred to the appropriate disciplinary committees at U of M.

Resources for learning and well-being

I am actively trying to create an economics course that reflects a commitment to diversity, equity, and inclusion. To that end, I aspire to build a reading list that features diverse perspectives, create a classroom environment that promotes open and respectful dialogue, and shine a light on distributional considerations in environmental quality and policy. Please tell me if any element of your course experience does not match this stated intent. I will very much appreciate your thoughts.

Below are a few learning resources, available through the University, that may be helpful to you:

- The [Sweetland Center for Writing](#) offers [one-on-one writing assistance](#), among many other services. It also offers [mini-courses and casual conversation groups](#) for international students or anyone wanting to improve their English.
- The [English Language Institute](#) provides a variety of resources for international students.
- The [Services for Students with Disabilities](#) (SSD) office coordinates accommodations for

disability. Come talk to us if this applies to you, so that we can make those accommodations as soon as possible.

And here are a few resources for well-being at UM:

- [Campus Maize and Blueprint](#) is the online hub for UM news and information related to COVID-19.
- The UM Office of Student Life provides [resources for student well-being](#).
- [Counseling and Psychological Services](#) (CAPS) provides confidential support options for any issue including stress, mood changes, and problems with eating and/or sleeping. CAPS now has a dedicated staff member for SEAS, Andrea Sieg (andsieg@umich.edu).

Course calendar

Date	Day	#	Unit	Assignment Due
1/5	Th	1	Introduction	
1/10	T	2	Markets I	
1/12	Th	3	Markets II	
1/17	T	4	Market failures I: Negative externalities	
1/19	Th	5	Market failures II: Additional challenges	
1/24	T	6	Equity I. Environmental Justice	Problem set 1
1/26	Th	7	Equity II: Economics and EJ	
1/31	T	8	Review	
2/2	Th	9	Quiz 1	
2/7	T	10	Policies I: Economic impacts	Opinion
2/9	Th	11	Policies II: Theory of market-based policy	
2/14	T	12	Policies III: Critical perspectives on market-based policy	
2/16	Th	13	Impacts of climate change	
2/21	T	14	Social cost of carbon	Problem set 2
2/23	Th	15	Inflation Reduction Act	
2/28	T	–	NO CLASS – VACATION	
3/2	Th	–	NO CLASS – VACATION	
3/7	T	16	Electricity I: Overview of power systems	
3/9	Th	17	Review	
3/14	T	18	Quiz 2	
3/16	Th	19	Electricity II: Electricity Strategy Game	
3/21	T	20	Electricity III: Renewables	
3/23	Th	21	Energy efficiency	
3/28	T	22	Electricity IV: ESG auction	
3/30	Th	23	Transportation	
4/4	T	24	Food and agriculture	Problem set 3
4/6	Th	25	Carbon neutrality	
4/11	T	26	Water	
4/13	Th	27	Climate action in Michigan	
4/18	T	28	Debrief ESG	ESG memo
4/24	M	–	–	Policy paper

Detailed course schedule

Class #1 – January 5. Introduction

Class #2 – January 10. Markets I. Marginal cost and benefit

Readings/viewing

1. Recorded lecture: marginal cost and marginal benefit
2. KO: Chapter 3, pp. 35-55.
3. (*Optional*) KO: Chapter 2, pp. 11-31.

Class #3 – January 12. Markets II. Equilibrium

Readings/viewing

1. Recorded lecture: equilibrium
2. KO: Chapter 4, pp. 69-79.
3. Kilian, Lutz and Xiaoqing Zhou. “[Gasoline Demand More Responsive to Price Changes than Economists Once Thought.](#)” Federal Reserve Bank of Dallas, June 16th, 2020.

Class #4 – January 17. Market failures I: Negative externalities

Readings/viewing

1. Recorded lecture: negative externalities
2. KO: Chapter 5, pp. 80-85.
3. (*Full episode optional*) Klein, Ezra with Leah Garcés. “[The Hidden Costs of Cheap Meat.](#)” *The Ezra Klein Show*. November 29th, 2022.

Class #5 – January 19. Market failures II: Additional challenges

Readings

1. Naam, Ramez. “[How to decarbonize America – and the world..](#)” TechCrunch, February 15th, 2019.

Class #6 – January 24. Equity I: Environmental Justice

Readings

1. Chapter 1 in Taylor, Dorceta E. Toxic Communities: Environmental Racism, Industrial Pollution, and Residential Mobility. New York University Press: New York, 2014. pp. 6-32.

2. (Optional) Schlanger, Zoe. “Choking to Death in Detroit: Flint Isn’t Michigan’s Only Disaster.” *Newsweek*, March 30th, 2016.

Assignments

1. Problem set 1 due

Class #7 – January 26. Equity II: Economics and EJ

Readings

1. Banzhaf, Spencer, Lala Ma, and Christopher Timmins (2019). “Environmental Justice: The Economics of Race, Place, and Pollution.” *Journal of Economic Perspectives* 33(1): 185-208.
2. (Optional) Ando, Amy, Titus Awokuse, Nathan Chan, Jimena González-Ramírez, Sumeet Gulati, Matthew Interis, Sarah Jacobson, Dale Manning, and Samuel Stolper (2023). “Environmental and Natural Resource Economics and Systemic Racism.”

Class #8 – January 31. Review

Class #9 – February 2. Quiz

Class #10 – February 7. Policies I: Economic impacts

Readings/viewing

1. Recorded lecture: passthrough and elasticities
2. Recorded lecture: policy impacts
3. (Optional) Fullerton, Don (2011). “Six Distributional Effects of Environmental Policy.” *Risk Analysis* 3(6): 923-929.
4. (Optional) Hernández-Cortés, Danae and Kyle C. Meng (2022). “Do Environmental Markets Cause Environmental Injustice? Evidence from California’s Carbon Market.” *Journal of Public Economics* 217: 104786.

Assignments

1. Opinion due

Class #11 – February 9. Policies II: Theory of market-based policy

Readings/viewing

1. Recorded lecture: emissions tax
2. Recorded lecture: cap and trade

3. Recorded lecture: cost-effectiveness
4. Rabe, Barry G. Chapter 1 in [Can We Price Carbon?](#) Cambridge: MIT Press, 2018.
5. (Optional) KO: Chapter 8, pp. 143-162; 168-184.

Class #12 – February 14. Policies III: Critical perspectives on market-based policy

Readings

1. Stokes, Leah and Matto Mildenberger. “[The Trouble with Carbon Pricing.](#)” The Boston Review, September 24th, 2020.
2. Climate Justice Alliance and Indigenous Environmental Network. “Carbon Pricing: A Critical Perspective for Community Resistance.” Volume 1, 2017.

Class #13 – February 16. Impacts of climate change

Readings

1. Hsiang, Solomon, Robert Kopp, Amir Jina, James Rising, Michael Delgado, Shashank Mohan, D.J. Rasmussen, Robert Muir-Wood, Paul Wilson, Michael Oppenheimer, Kate Larsen, and Trevor Houser (2017). “Estimating Economic Damage from Climate Change in the United States.” *Science* 356: 1362-1369.

Class #14 – February 21. Social cost of carbon

Readings

1. Carleton, Tamma and Michael Greenstone (2022). “A Guide to Updating the US Government’s Social Cost of Carbon.” *Review of Environmental Economics and Policy* 16(2):196-218.

Assignments

1. Problem set 2 due

Class #15 – February 23. Inflation Reduction Act

Readings

1. (Full episode optional) Klein, Ezra with Jesse Jenkins. “[The Single Best Guide to Decarbonization I’ve Heard.](#)” *The Ezra Klein Show*. September 20th, 2022.

February 28. NO CLASS – VACATION

March 2. NO CLASS – VACATION

Class #16 – March 7. Electricity I: Overview of power systems

Readings

1. Recorded lecture: electricity systems
2. “[Energy Data Explorer](#)”. *Our World in Data*, 2021.
3. (Optional) “[Electricity Explained: How Electricity is Delivered to Consumers.](#)” *Energy Information Administration*, last updated August 11th, 2022.

Class #17 – March 9. Review

Class #18 – March 14. Quiz 2

Class #19 – March 16. Electricity II: Electricity Strategy Game intro

Readings

1. Electricity game instructional materials

Class #20 – March 21. Electricity III: Renewables

Readings

1. Lazard. “[Levelized Cost of Energy, Version 15.0.](#)” October 28th, 2021.
2. Wolfram, Catherine. “[Is the Duck Sinking?](#)” *Energy Institute Blog*, University of California – Berkeley, April 24th, 2017.
3. Raimi, Daniel with Sarah Mills. “[Who Wants Wind and Solar in Their Communities?](#)” *Resources Radio*. December 13th, 2022.

Class #21 – March 23. Energy efficiency

Readings

1. Recorded lecture: energy efficiency
2. Berkouwer, Susanna and Joshua T. Dean. “[Can energy efficiency subsidies improve welfare in low-income countries? Evidence from Kenya says yes.](#)” *VoxDev*, May 25th, 2020.
3. Reames, Tony (2016). “Targeting energy justice: Exploring spatial, racial/ethnic, and socioeconomic disparities in urban residential heating energy efficiency.” *Energy Policy* 97: 549-558.

Class #22 – March 28. Electricity IV: ESG auction

In class: electricity game portfolio auction

Class #23 – March 30. Transportation

Readings

1. Springel, Katalin. “It’s Not Easy Being “Green”: Lessons from Norway’s Experience with Incentives for Electric Vehicle Infrastructure.” *Review of Environmental Economics and Policy* 15(2): 352-359.
2. Carreon, Alessandra, EJ Klock-McCook, Sudeshna Mohanty, Caitlin Odom, Charles Teplin, and Sarah Toth. “[Increasing Equitable EV Access and Charging: A Path Forward for States.](#)” Rocky Mountain Institute, October 2022.
3. (Optional) Maximilian Auffhammer. “[The EV Revolution Will Be Heavily Subsidized.](#)” *Energy Institute Blog* at UC Berkeley, January 28th, 2019.
4. (Optional) Campbell, Andrew. “[Electric Vehicles for Renters: Getting Landlords to Act.](#)” *Energy Institute Blog* at UC Berkeley, January 18th, 2022.

Class #24 -April 4. Food and agriculture

Readings

1. Ritchie, Hannah. “[Food production is responsible for one-quarter of the world’s greenhouse gas emissions.](#)” *Our World in Data*, November 6th, 2019.
2. Johnson, Ayana Elizabeth and Alex Blumberg. “[The Beef with Beef.](#)” *How to Save a Planet*, March 2021.
3. (Optional) Johnson, Ayana Elizabeth and Alex Blumberg. “[Soil: The Dirty Climate Solution.](#)” *How to Save a Planet*, January 2021.
4. (Optional) Hannah-Jones, Nikole. “[Land of Our Fathers, Part 1.](#)” *1619*, October 2019.

Assignments

1. Problem set 3 due

Class #25 – April 6. Carbon neutrality

Readings

1. Tabuchi, Hiroko. “[Switzerland Is Paying Poorer Nations to Cut Emissions on Its Behalf.](#)” *The New York Times*, November 10th, 2022.
2. Sallee, James. “[Voluntary Green Power to the Rescue?](#)”, *Energy Institute Blog* at UC Berkeley, August 1st, 2022.

Class #26 – April 11. Water

Guest lecturer: Dr. Michael Moore (SEAS)

Readings

1. Flavelle, Christopher. “As the Colorado River Shrinks, Washington Prepares to Spread the Pain.” *The New York Times*, January 27th, 2023.
2. Lustgarten, Abrahm. “40 Million People Rely on the Colorado River. It’s Drying Up Fast.” *The New York Times*, August 27th, 2021.
3. ABC10. “California Drought: The Colorado River crisis and water shortage. February 19th, 2023.
4. Moore, Michael R. “Surgery, Not a Band-Aid, for the Colorado River Basin.” February 7th, 2023.

Class #27 – April 13. Climate action in Michigan

Readings

1. Michigan Department of Environment, Great Lakes, and Energy (2022). “MI Healthy Climate Plan.”

Class #28 – April 18. ESG debrief

Assignments

1. ESG memo due

Monday, April 18. Policy paper deadline

Assignments

1. Policy paper due by noon