

# EAS 575: Climate Economics and Policy

Winter 2021 Course Syllabus  
(Version: April 2<sup>nd</sup>, 2021)

## Logistics

Lecture: T/Th 10:00-11:20 a.m. (Remote)

Zoom link for class: <https://umich.zoom.us/j/95779611602> (passcode: 506931)

Professor: Samuel Stolper (sstolper@umich.edu)

Graduate Student Instructor: Rosanna Ren (renr@umich.edu)

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

Office Hours: Sam: T 2:30-3:30pm, Th 4:00-5:00pm

<https://umich.zoom.us/j/6382313611>

Rosanna: M 1:00-2:00pm, W 4:00-5:00pm

<https://umich.zoom.us/j/96621707286>

## About this course

Climate change is an existential threat to all of humanity. It is a truly global collective action problem, whose social costs will be massive, widespread, unpredictable, and inequitably distributed. Economic analysis of the climate problem is valuable for a number of reasons: economics provides a framework for understanding incentives for human behavior; it facilitates the evaluation of markets and policies; 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 clarify the challenge of climate change, understand market function in emissions-intensive industries, and evaluate the theoretical and empirical impacts of the climate policies at our disposal. We will start by reviewing some foundational economic concepts, as well as modeling and comparing the impacts of market-based and prescriptive policies. In the second unit of the course, we will zoom in on electricity, a sector with enormous greenhouse gas emissions and enormous importance for widespread decarbonization. In the third unit, we will take a tour of several other applications of climate economics: carbon neutrality, energy efficiency, transportation, housing, and food and agriculture.

*Suggested prior coursework:* EAS 570. Environmental Economics: Principles, Methods, and Tools; or equivalent coursework elsewhere

## 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 climate economics and policy
- Develop a versatile economic intuition, for use in any environmental professional setting
- Become more comfortable with quantitative thinking and analysis

This course will proceed remotely, with in-class meetings on Zoom, and using the Canvas website for course materials. We will use the “flipped classroom” approach: I will record mini-lectures for you to watch before class (along with 1-2 short readings); and in the (Zoom) classroom, we will practice, discuss, and extend the lecture material. About halfway through the semester, we will begin playing a multi-week, team-based game simulating a wholesale electricity market.

Our Zoom classroom norms will be as follows:

1. Keep your audio muted when you are not speaking to the class.
2. In general, keep your video on (virtual backgrounds are welcome). If something comes up that calls for turning your video off temporarily, that is totally fine. If you are unable to or do not want to keep your video on more generally, that is also totally fine – in that case, please let me know why, if you are comfortable doing so.
3. Use the “raise hand” function in Zoom to signal to me that you have something to say or ask.
4. Let’s try to use chat only for quick, functional comments like “+1” or “you’re frozen”, etc., or else when otherwise prompted
5. In the interest of equity and access, all class sessions will be recorded and posted to the Canvas website. These recordings are not to be shared outside of the course (by me or by you), to protect everyone’s privacy. Still, your image and voice may be a part of these recordings. If you do not wish to be recorded, please contact me in the first week of class to discuss alternate arrangements. For more information, please see [UM’s page on class recording protocol](#).

## Attendance and participation

I expect you to attend class and to enter the Zoom 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. In the Zoom classroom, 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. In debrief discussions after breakout sessions, I will call on specific students to share their group’s thoughts/conclusions. At the beginning of each class, I will “warm call” on a specific student or two to briefly summarize the assigned lecture/reading material, which means I will let you know the day before class that I would like to call on you.

## 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 above under “Attendance and participation”.
- Problem sets (30%): Four problem sets combining graphical/mathematical analysis and qualitative assessment in different settings.
- 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. 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!

Final grades will be given according to the following rubric: A+: 97-100; A: 93-96; A-: 90-92; B+: 87-89; B: 80-86; B-: 70-80. I may adjust final grades upwards, if assignments turn out to have been harder than expected. I will not adjust final grades downwards.

## Readings

You will be assigned 1-2 readings per class, in addition to regular mini-lectures. These readings come from several different places: popular media, academic journals, government and NGO reports, and blogs. I am trying earnestly to minimize readings this semester in acknowledgement of the time it takes to watch and digest lectures. I expect everyone to complete the readings, and you should expect that each reading will come up during class discussion or elsewhere in the course.

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

**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. We know the pandemic and remote school format is making it hard to connect with your instructors, so please do think of office hours as a way to do so. The first page of this syllabus lists Rosanna'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 EAS 575 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, well-being, and inclusion

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 climate change and climate 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.

I also want to acknowledge how challenging the world is right now for many of us. We have some shared experience, and we also each have our own unique set of physical and mental challenges. We should all try to internalize this fact and give each other the benefit of the doubt. If at any point you are having difficulty participating, engaging, or meeting course expectations, please let me know. I promise to be understanding and flexible.

Below are some resources for well-being and inclusion 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](#).
- The Rackham Graduate School offers a resource for [Supporting Graduate Students During Stressful Times](#), prepared by the Mental Health Task Force.
- [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](mailto:andsieg@umich.edu)).
- [CEW+](#) provides immediate, ongoing services and financial support, especially to women and nontraditional students, but also to any students who encounter education and career obstacles based on their non-linear paths to the University community.
- Students with unexpected costs related to COVID-19 may request [CARES Act Emergency Funding](#) through the Student Self-Service Page of Wolverine Access. Eligible costs include the cost of child care, and supporting documentation requirements are not extensive.
- [Students of Color of Rackham](#) (SCOR) is a network for graduate and professional students dedicated to the social, cultural, and academic well-being of students of color.
- [Spectrum Center](#) works to enhance the campus climate and support services for LGBTQ+ students, staff, and faculty through education, advocacy, and community building.
- The Diversity, Equity, and Inclusion offices at [U of M](#) and [SEAS](#) maintain a large collection of excellent resources.

## Course calendar

Date	Day	#	Unit	Assignment Due
1/19	T	1	Introduction	Problem set 1
1/21	Th	2	Markets	
1/26	T	3	Externalities	
1/28	Th	4	Impacts of climate change	
2/2	T	5	Impacts of policy	
2/4	Th	6	Markets vs. mandates I	Problem set 2
2/9	T	7	Markets vs. mandates II	
2/11	Th	8	Review	
2/16	T	9	Quiz	
2/18	Th	10	Green New Deal	
2/23	T	11	Electricity I	Problem set 3
2/25	Th	12	Electricity II	
3/2	T	13	Electricity II	
3/4	Th	14	Electricity IV	
3/9	T	15	Electricity V	
3/11	Th	16	Electricity VI	
3/16	T	17	Review	
3/18	Th	18	Quiz	
3/23	T	–	NO CLASS – WELL-BEING BREAK	
3/25	Th	19	Carbon neutrality	
3/30	T	20	Energy efficiency	Problem set 4
4/1	Th	21	Transportation	
4/6	T	22	Housing	
4/8	Th	23	Electricity game debrief	
4/13	T	24	Food and agriculture	
4/15	Th	25	Natural climate solutions	ESG memo
4/20	T	26	Wrap-up	Policy paper

## Detailed course schedule

### Class #1 – January 19. Introduction

### Class #2 – January 21. Markets

#### Readings

1. Eitches, Eliana and Vera Crain. “[Using gasoline data to explain inelasticity.](#)” U.S. Bureau of Labor Statistics, Beyond the Numbers blog, March 5<sup>th</sup>, 2016.
2. *(Optional)* KO: Chapter 3, pp. 44-55; Chapter 4, pp. 69-79.

### Class #3 – January 26. Externalities

#### Readings

1. Naam, Ramez. “[How to decarbonize America – and the world..](#)” TechCrunch, February 15<sup>th</sup>, 2019.
2. *(Optional)* KO: Chapter 5, pp. 80-85.

### Class #4 – January 28. 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.
2. *(Optional)* Carleton, Tamma and Michael Greenstone (2021). “[Updating the United States Government’s Social Cost of Carbon.](#)” Working paper.
3. *(Optional)* Plumer, Brad. “[Trump Put a Low Cost on Carbon Emissions. Here’s Why It Matters.](#)” *New York Times*, August 23<sup>rd</sup>, 2018.

### Class #5 – February 2. Impacts of policy

#### Readings

1. Fullerton, Don (2011). “Six Distributional Effects of Environmental Policy.” *Risk Analysis* 3(6): 923-929.
2. *(Optional)* Guerin, Emily. “[Environmental Groups Say California’s Climate Program Has Not Helped Them.](#)” *National Public Radio*, February 24th, 2017.
3. *(Optional)* Cushing, Lara, Dan Blaustein-Rejto, Madeline Wander, Manuel Pastor, James Sadd, Allen Zhu, and Rachel Morello-Frosch (2018). “Carbon trading, co-pollutants, and environmental equity: Evidence from California’s cap-and-trade program (2011-2015).” *PLOS Medicine* 15(7).

4. *(Optional)* Hernandez-Cortes, Danae and Kyle C. Meng (2020). “Do Environmental Markets Cause Environmental Injustice? Evidence from California’s Carbon Market.” NBER Working Paper 27205.

#### Assignments

1. Problem set 1 due

### **Class #6 – February 4. Markets vs. mandates I**

#### Readings

1. Rabe, Barry G. Chapter 1 in Can We Price Carbon? Cambridge: MIT Press, 2018.
2. *(Optional)* KO: Chapter 8, pp. 143-156.

### **Class #7 – February 9. Markets vs. mandates II**

#### Readings

1. Climate Justice Alliance and Indigenous Environmental Network. “Carbon Pricing: A Critical Perspective for Community Resistance.” Volume 1, 2017.
2. *(Optional)* KO: Chapter 9, pp. 168-184.

### **Class #8 – February 11. Review**

#### Assignments

1. Problem set 2 due

### **Class #9 – February 16. Exam**

### **Class #10 – February 18. Green New Deal**

#### Readings

1. Gunn-Wright, Rhiana and Robert Hockett. “[The Green New Deal](#). New Consensus, January 2019.

### **Class #11 – February 23. Electricity I: Overview**

#### Readings

1. Popovich, Nadja and Brad Plumer. “[How Does Your State Make Electricity?](#) *New York Times*, October 28<sup>th</sup>, 2020.



2. (Optional) “[Electricity Explained: How Electricity is Deliver to Consumers.](#)” *Energy Information Administration*, last updated August 31<sup>st</sup>, 2018.

## **Class #12 – February 25. Electricity II: The Electricity Strategy Game**

### Readings

1. Electricity game instructional materials

## **Class #13 – March 2. Electricity III: Renewables**

### Readings

1. Morehouse, Catherine. “[Los Angeles Solicits Record Solar + Storage Deal at 1.997/1.3-cents per kWh.](#)” *Utility Dive*, July 2<sup>nd</sup>, 2019.
2. Noor, Dharna. “[The U.S. Needs a Supergrid.](#)” *Earther*, February 24<sup>th</sup>, 2021.
3. (Optional) Kutz, Jessica. “[The fight for an equitable energy economy for the Navajo Nation.](#)” *High Country News*, February 1<sup>st</sup>, 2021.

## **Class #14 – March 4. Electricity IV: PPAs and policies**

### Readings

1. Driscoll, William. “[Los Angeles to Explore Solar Partnership with the Navajo Nation.](#)” *pv magazine* April 23<sup>rd</sup>, 2020.
2. Funes, Yessenia. “[California’s New Solar Mandate Is For Rich White People.](#)” *Earther*, May 11<sup>th</sup>, 2018.
3. (Optional) “[U-M to Reduce Emissions through Renewable Energy Purchase from DTE Energy.](#)” University of Michigan Office of the Vice President for Communications, April 9<sup>th</sup>, 2019.
4. (Optional) Malone, Kenny and Jillian Weinberger. “[Das Green Old Deal.](#)” *Planet Money*, National Public Radio, January 17<sup>th</sup>, 2020.
5. (Optional) Meyer, Robinson. “[A Very Important Climate Fact that No One Knows.](#)” *The Atlantic*, May 8<sup>th</sup>, 2019.

## **Class #15 – March 9. Electricity V: Retail electricity**

### Readings

1. Malewitz, Jim. “[Michigan Shrinks Credits for Rooftop Solar, Clouding Industry’s Future.](#)” *Bridge Michigan*, May 20<sup>th</sup>, 2019.
2. (Optional) Borenstein, Severin. “[Reinventing Fixed Charges.](#)” *The Energy Institute* blog, University of California – Berkeley, November 16<sup>th</sup>, 2020.

### Assignments

1. Problem set 3 due

### **Class #16 – March 11. Electricity VI: ESG portfolio auction**

In class: electricity game portfolio auction

### **Class #17 – March 16. Review**

### **Class #18 – March 18. Quiz**

### **March 23. NO CLASS – WELL-BEING BREAK**

### **Class #19 – March 25. Carbon neutrality**

Readings

1. Nguyen, Terry. “[More Companies Want to Be “Carbon Neutral.” What Does That Mean?](#)” *Vox*, March 5<sup>th</sup>, 2020.
2. **Introduction** (pp. 7-10), President’s Commission on Carbon Neutrality. “[Final Report & Recommendations.](#)” University of Michigan, March 18<sup>th</sup>, 2021.
3. UM Climate Action Movement. “[Statement on the PCCN final report.](#)” March 18<sup>th</sup>, 2021.

### **Class #20 – March 30. Energy efficiency**

Readings

1. Burlig, Fiona. “[Cutting Energy Use Is One Way Cash-Strapped Schools Can Save. But By How Much?](#)” *Forbes*, September 27<sup>th</sup>, 2017.
2. Berkouwer, Susanna and Joshua T. Dean. “[Can energy efficiency subsidies improve welfare in low-income countries? Evidence from Kenya says yes.](#)” *VoxDev*, May 25<sup>th</sup>, 2020.
3. (Optional) Gillingham, Kenneth and Karen Palmer (2015). “Bridging the Energy Efficiency Gap: Policy Insights from Economic Theory and Empirical Evidence.” *Review of Environmental Economics and Policy* 8(1): 18-38.
4. (Optional) 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 #21 – April 1. Transportation**

Readings

1. Wolfram, Catherine. “[Electric Vehicle Owners Drive Less Than We Thought.](#)” *Energy Institute Blog*, February 16<sup>th</sup>, 2021.
2. Bliss, Laura. “[Uber and Lyft Could Do a Lot More for the Planet.](#)” *Bloomberg CityLab*, April 30<sup>th</sup>, 2018.
3. (Optional) Johnson, Ayana Elizabeth and Alex Blumberg. “[Are Electric Cars Really Better for the Climate?](#)” *How To Save a Planet* podcast, November 13<sup>th</sup>, 2020.
4. (Optional) Manville, Michael, Brian D. Taylor, and Evelyn Blumenberg (2018). “[Transit in the 2000s: Where Does It Stand and Where Is It Headed?](#)” *Journal of Public Transportation* 21(1): 104-118.

## **Class #22 – April 6. Housing**

### Readings

1. Sommer, Lauren. “[Why Sprawl Could Be the Next Big Climate Change Battle.](#)” *NPR*, August 6<sup>th</sup>, 2020.
2. Capps, Kriston. “[Bernie Sanders and AOC Unveil a Green New Deal for Public Housing.](#)” *Bloomberg CityLab*, November 14<sup>th</sup>, 2019.
3. (Optional) Tankersley, Jim. “[Biden Details \\$2 Trillion Plan to Rebuild Infrastructure and Reshape the Economy.](#)” *New York Times*, March 31st, 2021.
4. (Optional) Plumer, Brad and Nadja Popovich. “[How Decades of Racist Housing Policy Left Neighborhoods Sweltering.](#)” *New York Times*, August 24<sup>th</sup>, 2020.

### Assignments

1. Problem set 4 due

## **Class #23 – April 8. Electricity game debrief**

### No Readings

## **Class #24 -April 13. 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 6<sup>th</sup>, 2019.
2. Noor, Dharna. “[What India Really Needs to Do to Protect Its Farmers.](#)” *Earther*, February 18<sup>th</sup>, 2021.
3. (Optional) Samuel, Sigal. “[How to reduce your food’s carbon footprint, in 2 charts.](#)” *Vox*, February 20<sup>th</sup>, 2020.

### Assignments

1. Electricity game memo due

## **Class #25 – April 15. Natural climate solutions**

## Readings

1. “[How rich countries cause deforestation in poor ones.](#)” *The Economist*, March 29th, 2021.
2. “[Natural Climate Solutions.](#)” The Nature Conservancy, 2021.

## **Class #26 – April 20. Wrap-up**

### Assignments

1. Policy paper due