

ECON 330T – Fall 2024
Energy and Environmental Economics

Class Meetings:

Section 33965: TTH 12:30pm - 1:45pm in CAL 100

Section 33970: TTH 3:30pm - 4:45pm in JGB 2.216

Instructor: Jackson Dorsey

Contact: jackson.dorsey@austin.utexas.edu

Office Hours: Tuesdays 2:00pm - 3:00pm BRB 3.130 (in-person)

Teaching Assistant: Yumin Hong

Contact: yuhong@utexas.edu

Office Hours: Fridays from 9:00am-10:00am on Zoom ([Link](#))

Teaching Assistant: Aishwarya Agarwal

Contact: aishwarya.agarwal@utexas.edu

Office Hours: Fridays from 9:00am-10:00am on Zoom ([Link](#))

Initial Point of Contact:

Section 33965 (12:30pm): If you are enrolled in Section 33965 (12:30pm) please direct all questions regarding course content, grades, absences, or other course logistics to Aishwarya Agarwal at aishwarya.agarwal@utexas.edu.

Section 33970 (3:30pm): If you are enrolled in Section 33970 (3:30pm);, please direct all similar inquiries to Yumin Hong at yuhong@utexas.edu.

Course Summary: This course will investigate energy and environmental issues from an economic perspective using a quantitative approach. In the first part of the course, students will learn how to think about energy markets and the environment using tools from economics. The remainder of the course will focus on specific energy market issues such as oil and gas markets, electric vehicles, electricity markets, and renewable energy.

Course Outcomes:

1. Use and evaluate scientific and economic information to reach defensible conclusions.
2. Describe the implications of using markets to supply and allocate energy.
3. Identify market failures that justify energy policy interventions.
4. Develop skills to evaluate the benefits and costs of different energy policies.

Prerequisites: ECO 304K

Readings: There is no required textbook. Recommended readings will be posted on Canvas.

Mode of Instruction: This course will be delivered through in-person lectures.

Grading Scale:

A: 94–100; A-: 90–93.9

B+: 88–89.9; B: 83–87.9; B-: 80–82.9

C+: 78–79.9; C: 73–77.9; C-: 70–72.9

D+: 68–69.9; D: 63–67.9; D-: 60–63.9

F: < 60

Exams: There will be three in-class exams. This includes two midterms each covering material from approximately half of the course materials. There will also be an *optional* final exam, the final exam is cumulative and can replace your lowest midterm exam score. In other words, your best two out of three exams will count equally towards your final grade. Exams will be held in-person and there will not be a remote option. If you will be not able to attend one of the midterm exams for any reason, the final exam will become mandatory. Makeup exams will not be given, you must attend two out of three exams.

Problem Sets: There will be 4 problem sets with a mix of qualitative and quantitative questions. Problem sets will be posted at least one week before the due date and late submissions will not be accepted.

Games: We will play the Electricity Strategy Game to gain hands on experience with economic concepts and an understanding of electricity markets. Each group will complete a short assignment in advance to prepare for the game. Games will be held in-person and there will not be a remote option. If you will not be able to attend the games you should not be enrolled in the course.

Class Attendance: Lecture attendance is highly recommended but not required. At the start of the semester, students can choose between two grading policies. The default grading policy—Option A—does not include any component for attendance and participation during in-class lectures. Option B's allows students to earn points by attending classes and responding to in-class polls. In particular, student response rates to in-class polls will determine participation grades. Any student attending at least 80% of in-person lectures and responding to the associated polls will be rounded up to a 100% participation score. Students' grading policy choices are permanent and cannot be changed after the second week of the semester. Students that do not fill out the Canvas survey at the start of the semester will automatically default to Grading Policy Option A.

Grading Weight Policies:

Option A (Default)

Exams (Best 2 of 3): 75%

Problem Sets (4): 15%

Electricity Strategy Game: 10%

Option B - Participation Component

Exams (Best 2 of 3): 65%

Problem Sets (4): 15%

Electricity Strategy Game: 10%

Participation: 10%

Lecture Recordings: This class is using the Lectures Online recording system. This system records the audio and video material presented in class for you to review after class. Class recordings are reserved only for students in this class for educational purposes and are protected under FERPA. The recordings should not be shared outside the class in any form. Violation of this restriction by a student could lead to Student Misconduct proceedings. Links for the recordings will appear in the Lectures Online tab on the Canvas page for this class. You will find this tab along the left side navigation in Canvas. To review a recording, simply click on the Lectures Online navigation tab and follow the instructions presented to you on the page. You can learn more about how to use the Lectures Online system at <http://sites.la.utexas.edu/lecturesonline/students/how-to-access-recordings/>

Lecture Notes: Lecture notes will be posted on the course site.

Grade Appeals: If you wish to appeal your grade on an assignment you must bring it to our attention, in writing, within 24 hours of when the assignment is returned. I reserve the right to regrade the entire assignment and the new grade will be final.

Classroom Conduct: Electronic devices should only be used in the classroom for class purposes. These devices (laptops, tablets, phones, etc.) are prohibited during exams. If a student's use of an electronic device is disruptive to teaching and/or learning, I will ask that the student discontinue the use of that device. Please be considerate of those around you.

Academic Integrity: For homework assignments, you may consult with other students and/or us (during office hours). However, each person must complete his or her own assignment. You must complete exams without help. This class will follow the University's Code of Academic Integrity. Students who violate University rules on academic misconduct are subject to the student conduct process and potential disciplinary action. A student found responsible for academic misconduct may be assigned both a status sanction and a grade impact for the course. The grade impact could range from a zero on the assignment in question up to a failing grade in the course. A status sanction can range from probation, deferred suspension and/or dismissal from the University. To

learn more about academic integrity standards, tips for avoiding a potential academic misconduct violation, and the overall conduct process, please visit the Student Conduct and Academic Integrity website at: <http://deanofstudents.utexas.edu/conduct>.

Accessibility: The University of Texas is committed to ensuring access to learning opportunities for all students. If you have an access need, please contact me or Student Disability Services.

Acknowledgements: Many of the inspirations and materials for this course come from Todd Gerarden, Arthur van Benthem, Severin Borenstein, Erin Mansur, Blake Shaffer, and Mar Reguant.

Important Dates:

Midterm 1: Tuesday, October 8

Midterm 2: Tuesday, December 3

Final Exam: December 12 (12:30pm section), December 13 (3:30pm section)

Electricity Game (Attendance Required): October 24, October 29, October 31, November 5

No class : November 26, November 28 (Thanksgiving)

Course Outline and Readings:

The following is a list of optional readings that support the class content. Underlined readings are more technical – just try to get the gist of what’s in the article, don’t read the whole thing or stress about understanding every last detail.

*Topics and readings are subject to change.

Introduction

August 27: Introduction to Energy and Environmental Economics

- Jack, K. 2022, How much do we know about the development impacts of energy infrastructure?
- Naimoli and Ladislaw 2020, Deep Decarbonization Pathways.
- Energy Information Administration, 2022. Annual Energy Outlook 2022.
- International Energy Agency, 2021. World Energy Outlook 2021.

August 28: Microeconomics Review at 5 pm in TBD (optional)

August 29: Market Efficiency and Scarcity Pricing

- Simonetti, I. 2022. Exxon and Chevron Report Record Profits on High Oil and Gas Prices. *NYTimes*.
- ExxonMobil 2Q2022 Earnings Release

September 3: Market Efficiency and Scarcity Pricing (continued)

- [Marketplace: U.S. oil refiners are doing well, even though gasoline prices are down](#)
- DiSavino, 2019. Explainer: Why Are U.S. Natural Gas Prices in Texas Below Zero? *Reuters*.

Pollution, Market Failures, and Policy Solutions

September 5: Market Failures, Fossil Fuel Background

- [Pricing Nature \(Podcast episode 1\)](#)
- [Pricing Nature \(Podcast episode 2\)](#)
- [Investopedia: How the Oil and Gas Industry Works](#)
- [NPR: Breaking down the price of gasoline \(podcast\)](#)
- API, 2014. Understanding Crude Oil and Product Markets.

September 10: Markets for Pollution, Cap and Trade

- Goulder, L., 2013. Markets for Pollution Allowances: What Are the (New) Lessons?
- Schmalensee, R. and R. Stavins, 2019. Learning from Thirty Years of Cap and Trade.
- Mesa, N., 2024. Washington's controversial cap- and-trade program, explained. Really. *High Country News*. .

Economics of Oil and Gas and the Environment

September 12: Oil and Gas Upstream (The Hotelling Model of Resource Extraction)

- Eaton, C., 2020. Small Oil Drillers Are Turning Off Taps More Quickly Than Anticipated. *Wall Street Journal*.
- [WSJ Explains: The Forces Fueling 2020's Oil Bust \(4 min. video\)](#)

September 17: Environmental Policy in the Oil industry

- Heal, G. and W. Schlenker. 2019. Carbon Taxes and the Oil Market.
- Heal, G. and W. Schlenker. 2020. Coase, Hotelling and Pigou: The Incidence of a Carbon Tax and CO₂ Emissions. NBER Working Paper No. 26086.

September 19: Environmental Policy in the Oil industry II

- Clark, P. 2013. Norwegian's provocative plan to curb climate change wins EU prize. *The Financial Times*.
- Harstad, B. 2012. Buy Coal! A Case for Supply-Side Environmental Policy. *Journal of Political Economy*, 120(1). Only pages 77-80 required.
- Geman, B. 2021. Making Sense of Shell's Exit from the Permian Basin. *Axios*.
- Tabuchi, H. 2022. Oil Giants Sell Dirty Wells to Buyers With Looser Climate Goals, Study Finds. *NYTimes*.

September 24: Forecasting and Financial Markets for Oil and Gas

- [NPR: A Bet, Five Metals And The Future Of The Planet](#)
 - * Longer version: [Planet Money #508: A Bet On The Future Of Humanity](#)
- Worstall, T., 2013. But Why Did Julian Simon Win The Paul Ehrlich Bet? *Forbes*.
- Bailey, J., 2007. Southwest Airlines Gains Advantage By Hedging On Long-Term Oil Contracts. *The New York Times*.
- Hamilton, J., 2009. Understanding Crude Oil Prices. *The Energy Journal* 30(2). Only pages 179-188 required.

September 26: Oil and Gas Downstream: Monopolies and Rate-of-Return Regulation

- Davis, L.W. and Muehlegger, E., 2010. Do Americans consume too little natural gas? An empirical test of marginal cost pricing. *The RAND Journal of Economics*, 41(4), pp.791-810.
- S. Borenstein. "[Reinventing Fixed Charges](#)," Energy Institute Blog, UC Berkeley, November 16, 2020.
- Borenstein, Fowlie, and Sallee. 2021. Designing Electricity Rates for An Equitable Energy Transition. Energy Institute Working Paper 314.
- Davis and Hausman. 2022. Who will pay for legacy utility costs? *Journal of the Association of Environmental and Resource Economists*.
- Davis, L.W. and Kilian, L., 2011. The allocative cost of price ceilings in the US residential market for natural gas. *Journal of Political Economy*, 119(2), pp.212-241.

October 1: Oil and Gas Downstream: Gasoline Markets, Cars, Policies

- Larrick, R., and J. B. Soll, 2008. The MPG Illusion. *Science*.
- Anderson, S., et al., 2011. Automotive Fuel Economy Standards: Impacts, Efficiency, and Alternatives. *Review of Environmental Economics and Policy* 5(1).

October 3: Electric Vehicles

- Tabuchi, H. and B. Plumer, 2021. How Green are Electric Vehicles? *NYTimes*.
- Holland, S., et al., 2016. Are There Environmental Benefits from Driving Electric Vehicles? The Importance of Local Factors. *American Economic Review* 106(12).
- Should We Ban Gas-Powered Cars? *The Economist*, 2020.

October 7: Midterm 1 Review at 5pm in Cal 100 (optional)

October 8: **First Midterm Exam**

Economics of Electricity and the Environment

October 10: Electricity Background

- [Burn: How the grid works \(4 min. video\)](#)
- S. Borenstein. "[Pricing for the Short Run](#)," Energy Institute Blog, UC Berkeley, August 19, 2019.

October 15: Electricity Pricing and Investment

- "What Went Wrong with Texas's Main Electric Grid and Could It Have Been Prevented?" *Texas Monthly*, 2/17/21.

October 17: Market Power, Residual Demand and Market Manipulation

- M. Slezak, "Energy Companies Withholding Supply to Blame for July Price Spike, Report Finds," *The Guardian*, 8/17/16.
- P. Healy and K. Palepu, 2003. "The Fall of Enron," *Journal of Economic Perspectives* 17(2). [read up to p. 12]
- S. Borenstein, 2002. "The Trouble with Electricity Markets: Understanding California's Restructuring Disaster," *Journal of Economic Perspectives* 16(1): pp. 191-211.

October 22: Profit Maximization in Practice (Intro to the Electricity Strategy Game)

- Teams Prepare for the Electricity Strategy Game
- [Energy game manual](#)
- Portfolio Evaluation Guide on canvas

October 24, October 29, October 31, November 5: Electricity Strategy Game

- 1/2 of class will play the Electricity Strategy Game (in class) Tuesdays the other half will play Thursdays

Economics of Renewable Energy

November 7: Renewable Energy Background

- Bloomberg New Energy Finance. Renewable Energy Investment Tracker, 2H 2022. August 2022.
- Lazard. Levelized Cost of Energy Analysis – Version 15.0. October 2021.
- Lazard. Levelized Cost of Storage Analysis – Version 7.0. October 2021.
- S. Borenstein, 2012. "The Private and Public Economics of Renewable Electricity Generation," *Journal of Economic Perspectives* 26(1): pp. 67-92.

November 12: Renewable Energy Policy

- J. Dizard. "Tricky Tax Equity Erodes US Infrastructure Boom," *The Financial Times*, 1/6/2017.
- [Bipartisan Policy Center: IRA Summary - Energy and Climate Provisions](#)
- S. Borenstein. "Can Net Metering Reform Fix the Rooftop Solar Cost Shift?" Energy Institute Blog, UC Berkeley, January 25, 2021.
- J. Leslie. "Nevada's Solar Bait-and-Switch," *The New York Times*, 2/1/2016.
- J. Brady. "Solar Firms Plan To Return To Nevada After New Law Restores Incentives," *NPR*, 6/7/2017.

November 14: Renewable Energy Policy II

- [NPR's Planet Money Episode 616: How Solar Got Cheap](#)
- K. Bullis. "The Solar Panels Are Free, as Long as You Pay for the Power," *MIT Technology Review*, 1/5/2011.
- D. Cardwell. "Bonds Backed by Solar Power Payments Get Nod," *The New York Times*, 11/14/2013.
- C. Flammer, 2020. "Green Bonds: Effectiveness and Implications for Public Policy" *Environmental and Energy Policy and the Economy* 1(1): pp. 95-128.

November 19: Renewable Energy Procurement: Physical and Virtual Contracts

- ["Corporate Clean Energy Buying Grew 18% in 2020, Despite Mountain of Adversity"](#) *Bloomberg New Energy Finance*, 1/26/21.
- [Google: 24/7 by 2030: Realizing a Carbon-free Future](#)
- J. Bartlett, 2019. "Reducing Risk in Merchant Wind and Solar Projects through Financial Hedges" Resources for the Future Working Paper 19-06.

November 21: Energy Storage and Decarbonization

- [Vox: How America can leave fossil fuels behind, in one chart \(7 min. video\)](#)
- [Blackrock Investment Institute: Managing the Net-Zero Transition](#)
- L. Davis. "Electrification? We Are Already On The Way," Energy Institute Blog, UC Berkeley, November 4, 2019.
- Jacobson, Delucchi, Cameron, and Frew. 2015. "Stabilizing grid with 100% renewables 2050." *PNAS*, 112 (49) 15060-15065.
- Clack *et al.* 2017. "Evaluation of 100% wind, water, and solar power." *PNAS*, 114 (26) 6722-6727.

November 26, November 28: **No Class - Thanksgiving Break**

December 2: Midterm 2 Review at 5pm in Cal 100 (optional)

December 3: **Second Midterm Exam**

December 12 or December 13 : **Final Exam (Optional)**