

ECON 330T – Spring 2023
Energy and Environmental Economics

Class Meetings:

Section 34508: MW 8:30am - 9:45am in CAL 100
Section 34507: MW 11:30am - 12:45pm in CAL 100

Instructor:

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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 using tools from economics. The remainder of the course will focus on specific energy market issues such as market failures, regulation of pollution, electricity markets, markets for oil and gas, electric vehicles, and the economics of 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. Readings will be posted on canvas. The lectures, problem sets, and prelims will draw from these readings.

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

Grading Scale:

A: 93–100; A-: 90–92.9
 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 2 in-class exams. The exams will be held in-person and there will not be a remote option. If you will not be able to attend the exams you should not be enrolled in the course.

Problem Sets: There will be 4 problem sets with a mix of qualitative and quantitative questions. Problem sets will be posted 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 first 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 (2): 70%
 Problem Sets (4): 20%
 Electricity Strategy Game: 10%

Option B - Participation Component

Exams (2): 60%
 Problem Sets (4): 20%
 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.

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Important Dates:

Exam 1: February 27

Exam 2: April 26

No class: January 16, March 13, March 15, March 20

Course Outline and Readings:

An **O** before a reading indicates that it is optional. 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

January 9: Introduction to Business and Economics of Energy

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

January 11: Market Efficiency and Scarcity Pricing

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

January 16: **No Class - MLK Holiday**

January 17: Microeconomics Review at TBD in TBD (optional)

- TA will review prerequisite micro concepts

January 18: Market Efficiency and Scarcity Pricing (continued)

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

Economics of Oil and Gas and the Environment

January 23: Market Failures, Oil and Gas Background

- Pricing Nature (Podcast episode 1)
- O Pricing Nature (Podcast episode 2)
- Investopedia: How the Oil and Gas Industry Works
- O NPR: Breaking down the price of gasoline (podcast)

- API, 2014. Understanding Crude Oil and Product Markets.

January 25: 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 \(4 min. video\)](#)

January 30: Supply-side Environmental Policy

- 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.

February 1: Supply-side Environmental Policy 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*.

February 6: 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.

February 8: Oil and Gas Midstream

- [NPR: Backwardation in the oil market](#)
- Levine, M., 2020. Money Stuff: There's Nowhere to Put the Oil. *Bloomberg*.
- Gilbert, A., 2020. Oil prices are negative: What does it mean and what comes next? *Fast Company*.

February 13: Oil and Gas Downstream: Monopoly 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*.

February 15: Oil and Gas Downstream: Rate-of-Return and Incentive Regulation

- 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.

February 20: 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).
- 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.

February 22: Oil and Gas Downstream: Gasoline Markets, Cars, Policies (continued)

February 24: Exam 1 Review at TBD in TBD (optional)

February 27: **First Exam**

Economics of Electricity and the Environment

March 1: 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.

March 6: Scarcity Pricing, Investment, 2021 Texas Power Crisis

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

March 8: 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.

March 13, 15 : No Class - Spring Break

March 20: No Class

March 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

March 27 and 29: Electricity Strategy Game

- 1/2 of class will play the Electricity Strategy Game (in class) each day

Economics of Renewable Energy

April 3: 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.

April 5: 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.

April 10: Innovation Case Study: Solar

- [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.

April 12: 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.

April 17: Renewable Energy Procurement (continued)

April 19: Decarbonization and The Energy Transition

- [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.

April 21: Exam 2 Review at TBD in TBD (optional)

April 24: **Second Exam**