

AAE/ECON 371: ENERGY, RESOURCES AND ECONOMICS
DEPT. OF AGRICULTURAL AND APPLIED ECONOMICS
UNIVERSITY OF WISCONSIN - MADISON
FALL 2023

INSTRUCTOR: Sarah Johnston

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office hours: Mondays 1-3, and by appointment

COURSE DESCRIPTION: Use microeconomic theory to analyze energy markets. Discuss the economics of oil, gas, and electricity and learn about applications to contemporary issues and policy questions.

CREDITS: This is a 3 credit course.

PREREQUISITES: A A E 215, ECON 101, or ECON 111.

COURSE DESIGNATIONS: Intermediate Level; Counts as Liberal Arts and Science credit in L&S.

INSTRUCTIONAL MODE: Face-to-face.

LECTURES: Tuesday and Thursday, 9:30 am - 10:45 am in Russell Lab 150. This three credit course has two 75 min lectures per week. Students are expected to work approximately 6 hours outside class to complete assignments and learn the relevant material.

COURSE LEARNING OUTCOMES: By the end of this course, students should be able to do the following:

- use economic tools to describe energy demand
- apply economic models of competition to energy markets
- analyze how policies to mitigate climate change affect energy markets
- analyze the causes of and solutions for the sustainability challenge of climate change

- describe the social, economic, and environmental dimensions of energy policy and identify potential tradeoffs and interrelationships among these dimensions at a level appropriate to the course

COURSE WEBSITE: <https://canvas.wisc.edu/courses/374008>

READINGS: There is no textbook for this course. Readings for the course will be posted on Canvas. We will discuss the readings in class, so it is important you do them beforehand.

EMAIL: Please include “371” in the subject. For questions about course material, please use Piazza rather than email.

PIAZZA DISCUSSION: We will use Piazza for questions on problem sets, readings, and course material. You are encouraged to help your classmates by responding to their questions. You will also receive course credit for posting on Piazza. If you make at least five substantive contributions (posts or replies) over the course of the semester, you will receive full credit. Link: <https://piazza.com/wisc/fall2023/aaecon371>

OFFICE HOURS: I will hold office hours on Mondays from 1-3 in Taylor Hall 416. After class is also usually a good time to ask questions.

PROBLEM SETS: There will be eight problem sets, with the due date given at the top of each assignment. **Problem sets must be submitted in class, at the beginning of class (9:30 AM). If you are feeling unwell, please submit your assignment via email rather than coming to class.** The purpose of the problem sets is to help you learn the material and allow you to monitor your progress in the course. The style of questions asked will be similar to the style of questions on exams. Therefore, completing the problem sets and carefully reviewing the answers is an important way you can prepare for the exams.

Problem sets will be graded on a 4 point scale that corresponds to ✓+, ✓, ✓-, ✓- -. You will receive full credit if you make a serious effort to solve every problem. To demonstrate this, you will need to show your work on all problems. If you cannot figure out how to solve a problem, write down what you tried and why you tried it. Part of demonstrating effort is submitting assignments that are neat, organized, and legible. Incorrect answers will not necessarily be marked, so you will want to be sure to review your own work. Note, **you will not receive full credit if you skip any subpart of any problem.**

Problem sets submitted up to 24 hours late will be accepted with a one point penalty. Problem sets more than 24 hours late receive no credit. Because last second emergencies happen, your lowest problem set score will be dropped when calculating your final grade. **While students are encouraged to collaborate on the problem sets, problem sets must be written up individually.** No credit will be given for identical problem sets.

EXAMS: There will be two exams during the semester, one midterm exam administered in class, and one final exam administered during the University's exam period. The dates are as follows:

- Midterm 1: 10/24/2023, in class
- Final Exam: 12/18/2023, 2:45-4:45

If a student has a valid reason for missing the midterm exam, there will be no make-up offered at an alternative time; the weight for the midterm exam will be placed on the final exam. If a student has a valid reason for missing the final, we can arrange a special date and time for a make-up exam. Valid reasons for missing an exam are limited to illnesses and family emergencies.

The first midterm will cover the first half of the course (through oil and gas markets on the schedule). The final exam will be weighted toward the second half of the course (beginning with electricity markets). Questions about the OPEC strategy game may be asked on either exam.

OPEC STRATEGY GAME: In the middle part of the course, we will play a group-based strategy game. Your grade in this game will be primarily based on a memo describing why your team played the strategy it did. It will also include credit for active participation.

PARTICIPATION: You are encouraged to ask questions in class. Almost always, another student will have the same question or find the same explanation unclear. Please be considerate of your classmates by not emailing, texting, or surfing the internet during class time. Your participation in class discussions enhances the learning of all students.

GRADING: Your final grade will be computed using the following weighting scheme:

20%: Problem Sets

20%: OPEC Game

5%: Piazza

25%: Midterm Exam

30%: Final Exam

Letter grades will be assigned based on total score at the end of the course. I plan to use the following cutoffs:

$\geq 92\%$	A
$\geq 88\% \ \& \ < 92\%$	AB
$\geq 82\% \ \& \ < 88\%$	B
$\geq 78\% \ \& \ < 82\%$	BC
$\geq 70\% \ \& \ < 78\%$	C
$\geq 60\% \ \& \ < 70\%$	D
$< 60\%$	F

If you score higher on the final exam, I will re-weight the two exams when calculating your final grade as follows: 20% on the midterm, 35% on the final. I reserve the right to adjust these cutoffs downward; they will not be adjusted upward.

ACKNOWLEDGEMENTS: I am grateful to Shaun McRae, as much of the material in this course is adapted from his energy economics course. Jesse Burkhardt and Paul Brehm also helped with the design of this course, and Severin Borenstein generously shared the OPEC game.

UNIVERSITY-WIDE POLICIES

ACADEMIC INTEGRITY: By virtue of enrollment, each student agrees to uphold the high academic standards of the University of Wisconsin-Madison; academic misconduct is behavior that negatively impacts the integrity of the institution. Cheating, fabrication, plagiarism, unauthorized collaboration, and helping others commit these previously listed acts are examples of misconduct which may result in disciplinary action. Examples of disciplinary action include, but is not limited to, failure on the assignment/course, written reprimand, disciplinary probation, suspension, or expulsion.

DIVERSITY & INCLUSION: Diversity is a source of strength, creativity, and innovation for UW-Madison. We value the contributions of each person and respect the profound ways their identity, culture, background, experience, status, abilities, and opinion enrich the university community. We commit ourselves to the pursuit of excellence in teaching, research, outreach, and diversity as inextricably linked goals. The University of Wisconsin-Madison fulfills its public mission by creating a welcoming and inclusive community for people from every background - people who as students, faculty, and staff serve Wisconsin and the world.

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES: The University of Wisconsin-Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (Faculty Document 1071) require that students with disabilities be reasonably accommodated in instruction and campus life. Reasonable accommodations for students with disabilities is a shared faculty and student responsibility. Students are expected to inform me of their need for instructional accommodations by the end of the third week of the semester, or as soon as possible after a disability has been incurred or recognized. I will work either directly with you or in coordination with the McBurney Center to identify and provide reasonable instructional accommodations. Disability information, including instructional accommodations as part of a student's educational record, is confidential and protected under FERPA.

COURSE SCHEDULE (SUBJECT TO CHANGE)

I. INTRODUCTION

September 7	Intro - ASYNCHRONOUS CLASS
September 12 & 14	Short-run and long-run energy demand
September 19 & 21	When markets fail: monopolies and externalities

II. OIL AND GAS MARKETS

September 26 & 28	Optimal extraction of non-renewable resources
October 3 & 5	Introduction to the oil and natural gas industries
	Introduction to the OPEC Game
October 10 & 12	Futures markets, speculation, and oil prices
October 12	OPEC INITIAL STRATEGY WRITE-UP DUE¹
October 17 & 19	Fracking, pipelines, and the North American energy market
October 24	MIDTERM EXAM 1
October 26	NO CLASS

III. ELECTRICITY MARKETS

October 31	OPEC group meetings in class
November 2 & 7	Natural monopoly, regulation, and the electricity industry
November 9 & 14	Restructuring electricity markets and market power
November 16 & 21	Renewable electricity generation
November 16	OPEC GAME MEMO DUE
November 23	NO CLASS - THANKSGIVING
November 28 & 30	Electricity transmission policy
December 5 & 7	Retail pricing and distributed generation
December 12	Electric Vehicles

¹Updated 9/30/2023 - The original syllabus mistakenly had the date is the 17th.

TENTATIVE SCHEDULE OF PROBLEM SET DUE DATES

PROBLEM SET	DUE DATE
1	Tuesday, September 19, 2023
2	Tuesday, September 26, 2023
3	Tuesday, October 10, 2023
4	Thursday, October 19, 2023
5	Tuesday, November 7, 2023
6	Thursday, November 16, 2023
7	Tuesday, December 5, 2023
8	Tuesday, December 12, 2023