

**AAE/ECON 371: ENERGY, RESOURCES AND ECONOMICS**  
**DEPT. OF AGRICULTURAL AND APPLIED ECONOMICS**  
**UNIVERSITY OF WISCONSIN - MADISON**  
**FALL 2021**

**INSTRUCTOR:** Sarah Johnston

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office: 416 Taylor Hall

office hours: Mondays 4:30-6:30 on Zoom, 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 3024 Engineering Hall. 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

**COURSE WEBSITE:** <https://canvas.wisc.edu/courses/272478>

**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.

**OFFICE HOURS:** I will hold office hours on Mondays from 4:30-6:30 on Zoom. If you prefer to meet in person, after class is usually a good time. OH Zoom link:

Meeting ID - 930 6469 8008, Passcode - 472740

<https://uwmadison.zoom.us/j/93064698008?pwd=NHgzdDNNR1RSTEZCRDlDeTI1bFFZQT09>

**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  $\checkmark+$ ,  $\checkmark$ ,  $\checkmark-$ ,  $\checkmark--$ . 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, both administered in class. The dates are as follows:

- Midterm 1: 10/26/2021, in class
- Midterm 2: 12/14/2021, in class

If a student has a valid reason for missing either midterm exam, there will be a make-up exam offered at an alternative time. Valid reasons for missing an exam are limited to illnesses and family emergencies. Do not take this class if you have a trip planned during one of the exams.

The first midterm will cover the first half of the course (through oil and gas markets on the schedule). The second midterm will cover 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:

25%: Problem Sets

20%: OPEC Strategy Memo

5%: Piazza

25%: Midterm Exam 1

25%: Midterm Exam 2

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 midterm 2 than on midterm 1, I will re-weight the two exams when calculating your final grade as follows: 20% on midterm 1, 30% on midterm 2. I reserve the right to adjust these cutoffs downward; they will not be adjusted upward.

**COVID-19 CONTINGENCIES:** Should you become ill, we can work together to ensure you do not fall behind in the course. Should I become ill, I will let you know by email how we will proceed. Should UW transition to online classes, we will have a synchronous lecture during our regular class time.

Synchronous lecture info (if necessary):

Meeting ID - 930 8373 7492; Passcode - 814807

<https://uwmadison.zoom.us/j/93083737492?pwd=VkFpcWk2eEdXOG1OU243NVV1V2UvZz09>

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## 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 9	Intro and energy basics
September 14 & 16	Short-run and long-run energy demand
September 21 & 23	When markets fail: monopolies and externalities

### II. OIL AND GAS MARKETS

September 28 & 30	Optimal extraction of non-renewable resources
October 5 & 7	Introduction to the oil and natural gas industries Introduction to the OPEC Game
October 12 & 14	Futures markets, speculation, and oil prices
October 19 & 21	Fracking, pipelines, and the North American energy market
October 26	<b>MIDTERM EXAM 1</b>
October 28	OPEC group meetings in class

### III. ELECTRICITY MARKETS

November 2 & 4	Natural monopoly, regulation, and the electricity industry
November 9 & 11	Restructuring electricity markets and market power
November 16 & 18	Valuing renewable electricity generation
November 18	<b>OPEC GAME MEMO DUE</b>
November 23	<b>NO CLASS</b>

### IV. SPECIAL TOPICS

November 30 & December 2	Electricity transmission and retail electricity pricing
December 7 & 9	DG, electric vehicles, energy and economic development
December 14	<b>MIDTERM EXAM 2</b>

## TENTATIVE SCHEDULE OF PROBLEM SET DUE DATES

PROBLEM SET	DUE DATE
1	Tuesday, September 21, 2021
2	Tuesday, September 28, 2021
3	Tuesday, October 12, 2021
4	Thursday, October 21, 2021
5	Tuesday, November 9, 2021
6	Tuesday, November 16, 2021
7	Tuesday, November 30, 2021
8	Thursday, December 9, 2021