

**A A E/ECON 371: ENERGY, RESOURCES AND ECONOMICS**  
**DEPT. OF AGRICULTURAL AND APPLIED ECONOMICS**  
**UNIVERSITY OF WISCONSIN - MADISON**  
**Fall 2019**

**INSTRUCTOR:** Sarah Johnston  
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office hours: TBD

**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, 1:00 pm - 2:15 pm. 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 WEBSITE:** All course material will be posted on Canvas. Website address to be decided.

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

- use economic tools to describe the production and consumption of energy
- apply economic models of competition to energy markets
- analyze how policies to mitigate climate change affect energy markets

**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 that you do them beforehand.

**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.** 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 ✓, ✓- scale, and 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 stapled. Incorrect answers will not necessarily be marked, so you will want to be sure to review your own work.

Late problem sets will not be accepted. Because last second emergencies sometimes occur, 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 administered in class, and one final exam administered during the University's exam period. The dates are as follows:

- Midterm: 3/12/2019, in class
- Final Exam: time and place scheduled by UW-Madison

If you cannot take the exams at these times, do not take this course. If you are entitled to testing accommodations from the McBurney Resource Center, you must submit your McBurney VISA to me by February 8, 2019. Any student who has not done so by that date will not be eligible for extra time or other accommodations during examinations.

Valid reasons for missing an exam are limited to serious illnesses and family emergencies, and you will be required to provide supporting documentation. If a student has a valid reason for

missing the midterm exam, there will be no make-up offered at an alternative time: weights placed on the other components of the final grade will be increased proportionately. If a student has a valid reason for missing the final, we can arrange a special date and time for a make-up exam.

The midterm exam will cover the first half of the course (through oil and gas markets on the schedule). The second exam 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 based on a memo describing why your team played the strategy it did.

**PARTICIPATION:** You are expected to attend all class meetings. 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 Strategy Memo

30%: Midterm Exam

30%: Final Exam

Letter grades will be assigned based on total score as follows:

$\geq 93\%$	A
$\geq 88\% \ \& \ < 93\%$	AB
$\geq 83\% \ \& \ < 88\%$	B
$\geq 78\% \ \& \ < 83\%$	BC
$\geq 70\% \ \& \ < 78\%$	C
$\geq 60\% \ \& \ < 70\%$	D
$< 60\%$	F

For students close to the cutoff between two grades, attendance and participation in the lectures will count towards receiving the higher grade.

**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.

## COURSE SCHEDULE (SUBJECT TO CHANGE)

### I. INTRODUCTION

January 22 & 24	Introduction to energy economics
January 29 & 31	Short-run and long-run energy demand
February 5 & 7	When markets fail: monopolies and externalities

### II. OIL AND GAS MARKETS

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

### III. ELECTRICITY MARKETS

March 26 & 28	Natural monopoly, regulation, and the electricity industry
April 2 & 4	Restructuring electricity markets and market power
April 9 & 11	Valuing renewable electricity generation
April 11	<b>OPEC GAME MEMO DUE</b>
April 16 & 18	Investment in the electricity transmission, market integration

### IV. SPECIAL TOPICS

April 23 & 25	Retail electricity pricing and distributed generation
April 30 & May 2	Electric vehicles and the future of transportation
May 5	<b>FINAL EXAM</b>

## TENTATIVE SCHEDULE OF PROBLEM SET DUE DATES

PROBLEM SET	TENTATIVE DUE DATE
1	Tuesday, February 5, 2019
2	Tuesday, February 12, 2019
3	Tuesday, February 26, 2019
4	Thursday, March 7, 2019
5	Tuesday, April 9, 2019
6	Tuesday, April 16, 2019
7	Tuesday, April 23, 2019
8	Tuesday, April 30, 2019

## **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.

## **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.