

Energy Economics and Policy

11:373:335, 3 credits

Prerequisites: 11:373:121 or 01:220:102

Class hours:

Monday 10:55-12:15 & Thursday 10:55-12:15, RAB-110A.

Instructor:

Gal Hochman

55 Dudley Road, Room 114

Cook Campus

Rutgers, The State University of New Jersey

New Brunswick NJ, 08901

Phone: (848) 932-9142

Fax: (732) 932-8887

Office hours:

Monday 4:10-5:10

Texts:

These texts have been ordered for our class. Whether you purchase it is up to you; however, it is a widely accepted standard reference for our field and would be a worthwhile addition to your personal library.

Godfrey Boyle. 2012. Renewable energy: power for a sustainable future, Third edition, Oxford Press.

In addition, class slides will be provided

Course Description:

This course will provide students with the ability to apply and communicate microeconomic principles for policy formulation and decision making in energy economics. The course will survey various energy resources and energy commodities and discuss forces motivating firms and consumers to supply, convert, transport, and use energy resources. The course will also teach market structures and regulatory structures; distributional and environmental consequences; and economically efficient use of energy resources. To this end, the world's energy resources are depletable or renewable, storable or non-storable. Market forces may guide a transition to renewables, where environmental damages from energy use include climate change from greenhouse gases, primarily carbon dioxide. Environmental costs not incorporated into energy prices (externalities) lead to overuse of energy and motivate policy interventions.

Learning Goals:

Learning goals will be achieved by providing students with ability to apply and communicate microeconomic principles for policy formulation and decision making in energy. By the end of the course, students should be able to:

1. Formulate energy-related policies (related to the transportation, power, heat, and electricity) to accomplish objectives that can be stated in economic terms.

2. Understand the most common economic and environmental causes of energy policy problems.
3. Diagnose potential energy policy problems and understand the economic policy used to correct these problems in market, as well as non-market, economies.
4. Extend the concepts discussed in class to understand renewable and alternative energy contexts, and develop and analyze new policies to address new concerns.

Other publications with which you may want to be acquainted with:

Anil Markandya, Andrea Bigano, and Roberto Porchia. 2010. The Social Cost of Electricity: Scenarios and Policy Implications, FEEM.

Roy L. Nersesian. 2010. Energy for the 21st Century: A Comprehensive Guide to Conventional and Alternative Sources

Committee on U.S.-China Cooperation on Electricity from Renewable Resources; National Research Council; Chinese Academy of Sciences; Chinese Academy of Engineering. 2010. "The Power of Renewables: Opportunities and Challenges for China and the United States," available at <http://www.nap.edu/catalog/12987.html>

America's Energy Future Panel on Alternative Liquid Transportation Fuels; National Academy of Sciences; National Academy of Engineering; National Research Council . 2009. "Liquid Transportation Fuels from Coal and Biomass Technological Status, Costs, and Environmental Impacts," This PDF is available from the National Academies Press at: <http://www.nap.edu/catalog/12620.html>

The National Research Council. 2011. "Renewable Fuel Standard: Potential Economic and Environmental Effects of U.S. Biofuel Policy," available at http://www.nap.edu/catalog.php?record_id=13105.

The National Research Council. 2011. "Well-Deepwater Horizon Blowout," available at http://www.nap.edu/catalog.php?record_id=13273.

Genie out of the Bottle: World Oil Since 1970, Morris Adelman;

Hubbert's Peak: the Impending World Oil Shortage, Kenneth Deffeyes;

Petroleum Economics: Issues and Strategies of Oil and Natural Gas Production, Rögnvaldur Hannesson

The Quest: Energy Security, and the Remaking of the Modern World, Daniel Yergin

The Prize: The Epic Quest for Oil, Money & Power, Daniel Yergin

Energy and Environmental Policy in China, ZhongXiang Zhang (2011)

Course Policies:*A. Class Participation*

This is a participatory class; you will frequently be asked during class discussions to (i) offer your opinions about the realism of major assumptions and (ii) draw on your personal experience to offer insights into the logical steps required to arrive at key conclusions. (These responsibilities are much easier to meet if you have done the reading ahead of time.)

B. Required Readings

Our discussions will draw upon an intermediate knowledge of microeconomics. To help you integrate energy economics with your prior knowledge of economics as quickly as possible, lectures have been prepared presuming you are familiar with the content of required readings before arriving in class. Each required reading within a subject area will be indicated with an asterisk (*); read this before we begin to discuss the listed topic.

C. Other Related Readings

This syllabus has been prepared to serve not only as a guide to the course, but also to give you some exposure to literature in energy economics. For this reason, this syllabus includes some examples of recent published research from major publishers and journals. The citations are not intended to be an exhaustive list. They have been included to give you examples of influential or representative approaches and to help you gain more from our class discussions. Lectures will frequently make references to related material, but it will never be presumed that you have read any of the other related readings (in contrast to required readings, above). If you are interested in representative articles on subjects other than those listed in the syllabus, please contact me and I will attempt to provide you with additional citations.

D. Lecture Strategy

The lectures will use the readings as starting points, but will contain references to other readings, empirical results, syntheses of trends in the literature, and discussion of key points from the other relevant readings. Missing a lecture will cost you understanding and perhaps a key inspiration you are seeking. We have roughly thirty hours together.

E. Rutgers University Policies

All faculty, staff, and students at our University are bound by University policies. All aspects of this course will be conducted according to these policies. (Please see 7 for additional information.)

Grading Policies:

10% Class participation/Attendance
15% Homework
30% Quizzes
30% Midterm Exams (2, 20% each)
15% Final project

Weekly Quizzes

The course includes five general topic areas. A short quiz will be given in class every week or two based on concepts discussed in class. You can drop one quiz for any reason. No makeup quizzes will be offered without written medical, religious, or legal documentation. Quizzes missed for documented medical, religious, or legal reasons must be made up within one week of returning to class.

Class project

The project will use an existing anaerobic digester system as a baseline that students will strive to improve. Students will design and improve the existing system, making it more sustainable through the reduction of both energy use and environmental footprint as well as the outputs it generates. Students will work with real data in the literature and make economic decisions that have direct impact on the production process and the outputs produced. The students will also judge their projects and analysis and evaluate the various ideas proposed by their peers.

Specifically, toward the middle of the spring semester, the energy class will break into small groups and explore alternative paths from biogas to renewable natural gas to organic fertilizers and bioplastics (that is, explore the system's potential and learn more of energy efficiency, conservation and use of renewable energy). The groups will come up with alternative plans of how to improve energy use and biomass production. The groups will develop a presentation, where they try to promote their ideas to the class. The students will then evaluate the various proposed projects and rank them. In addition, each group will submit a two-page executive summary, which will also be graded. A rubric for the executive summary will be supplied to guide you in the preparation of the summary and the project more generally.

Letter Grade Assignments:

At any time you may calculate your grade in this course. There is a total of 100 points possible (see above). Final grades will be assigned using the scale given below. To calculate your expected final grade, simply add the grades from your completed exams with the grades you plan to get on forthcoming exams and refer to the table below.

90+ A
85+ B+
80+ B
75+ C+
70+ C
60+ D
60- F

Accommodations for Students with Disabilities

Please follow the procedures outlined at <https://ods.rutgers.edu/students/registration-form>. Full policies and procedures are at <https://ods.rutgers.edu/>

Absence Policy

Students are expected to attend all classes; if you expect to miss one or two classes, please use the University absence reporting website <https://sims.rutgers.edu/ssra/> to indicate the date and reason for your absence. An email is automatically sent to me.

Lecture/Discussion Schedule:

Session 0, week 1

Introduction to the course

Introduction

Session 1, week 1:

Basic principles in economics

Review.

Sessions 2-14, weeks 2-7:

Oil & Gas

1. History of oil industry (sessions 2-4)
2. Principles of oil production (sessions 5-9)
 - a. Importance of infrastructure
 - b. Economic theory of the mine, as applied to petroleum
 - c. Peak oil
3. Societal management of oil wealth (sessions 10-11)
4. Comparison of oil economics and gas economics (session 12-13)
5. Institutional issues related to natural gas production, distribution and sales (session 14)

Genie out of the Bottle: World Oil Since 1970, Morris Adelman;

Hubbert's Peak: the Impending World Oil Shortage, Kenneth Deffeyes;

Petroleum Economics: Issues and Strategies of Oil and Natural Gas Production, Rögnvaldur Hannesson

The Quest: Energy Security, and the Remaking of the Modern World, Daniel Yergin

Session 15, week 8:

Review session

Session 16, week 8:

First midterm

Session 17-18, week 9:

Alternatives to conventional fossil fuels

1. Unconventional alternatives: (session 17)
 - a. Tar sand
 - b. Shale gas
2. Renewable alternatives: (sessions 18-22)
 - a. Biomass
 - b. Wind

- c. Solar
- d. Hydroelectric
- e. Geothermal
- f. Nuclear

The Quest: Energy Security, and the Remaking of the Modern World, Daniel Yergin

* Chapters 3, 4, & 8, Roy L. Nersesian. Energy for the 21st Century: A Comprehensive Guide to Conventional and Alternative Sources

Sessions 18-24, weeks 10-12:

Energy and the environment

* Chapter 4, Anil Markandya, Andrea Bigano, and Roberto Porchia. 2010. "The Social Cost of Electricity: Scenarios and Policy Implications"

Energy and Environmental Policy in China

Session 25-28, week 13-14 (Quiz 8):

1) Electricity, power, and heat

* Summary and chapter 1, "The Power of Renewables: Opportunities and Challenges for China and the United States."

Session 29, week 15:

Summary and Review

Session 30, week 15:

Second midterm exam

Academic Integrity

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The university's policy on Academic Integrity is available at <http://academicintegrity.rutgers.edu/academic-integrity-policy>. The principles of academic integrity require that a student:

- properly acknowledge and cite all use of the ideas, results, or words of others.
- properly acknowledge all contributors to a given piece of work.
- make sure that all work submitted as his or her own in a course or other academic activity is produced without the aid of impermissible materials or impermissible collaboration.
- obtain all data or results by ethical means and report them accurately without suppressing any results inconsistent with his or her interpretation or conclusions.
- treat all other students in an ethical manner, respecting their integrity and right to pursue their educational goals without interference. This requires that a student neither facilitate academic dishonesty by others nor obstruct their academic progress.
- uphold the canons of the ethical or professional code of the profession for which he or she is preparing.

Adherence to these principles is necessary in order to ensure that

- everyone is given proper credit for his or her ideas, words, results, and other scholarly accomplishments.
- all student work is fairly evaluated and no student has an inappropriate advantage over others.
- the academic and ethical development of all students is fostered.
- the reputation of the University for integrity in its teaching, research, and scholarship is maintained and enhanced.

Failure to uphold these principles of academic integrity threatens both the reputation of the University and the value of the degrees awarded to its students. Every member of the University community therefore bears a responsibility for ensuring that the highest standards of academic integrity are upheld.

Enter optional text or delete. Copy and paste elsewhere if you wish to edit. Here is an example from a syllabus (spring 2010 Andy Egan 01:730: 252 Eating Right: Cheating on tests or plagiarizing materials in your papers deprives you of the educational benefits of preparing these materials appropriately. It is personally dishonest to cheat on a test or to hand in a paper based on unacknowledged words or ideas that someone else originated. It is also unfair, since it gives you an undeserved advantage over your fellow students who are graded on the basis of their own work. In this class we will take cheating very seriously. All suspected cases of cheating and plagiarism will be automatically referred to the Office of Judicial Affairs, and we will recommend penalties appropriate to the gravity of the infraction. To help protect you, and future students, from plagiarism, we require all papers to be submitted through Turnitin.com.

Students Wellness Services

The Rutgers University Student Assembly urges that this information be included at the end of every syllabus. Edit or delete as you wish:

Just In Case Web App <http://codu.co/cee05e>

Access helpful mental health information and resources for yourself or a friend in a mental health crisis on your smartphone or tablet and easily contact CAPS or RUPD.

Counseling, ADAP & Psychiatric Services (CAPS)

(848) 932-7884 / 17 Senior Street, New Brunswick, NJ 08901/ www.rhscaps.rutgers.edu/

CAPS is a University mental health support service that includes counseling, alcohol and other drug

assistance, and psychiatric services staffed by a team of professional within Rutgers Health services to support students' efforts to succeed at Rutgers University. CAPS offers a variety of services that include: individual therapy, group therapy and workshops, crisis intervention, referral to specialists in the community and consultation and collaboration with campus partners.

Violence Prevention & Victim Assistance (VPVA)

(848) 932-1181 / 3 Bartlett Street, New Brunswick, NJ 08901 / www.vpva.rutgers.edu/

The Office for Violence Prevention and Victim Assistance provides confidential crisis intervention, counseling and advocacy for victims of sexual and relationship violence and stalking to students, staff and faculty. To reach staff during office hours when the university is open or to reach an advocate after hours, call 848-932-1181.

Disability Services

(848) 445-6800 / Lucy Stone Hall, Suite A145, Livingston Campus, 54 Joyce Kilmer Avenue, Piscataway, NJ 08854 <https://ods.rutgers.edu/>

Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: <https://ods.rutgers.edu/students/documentation-guidelines>. If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with a Letter of Accommodations. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. To begin this process, please complete the Registration form on the ODS web site at: <https://ods.rutgers.edu/students/registration-form>.

Scarlet Listeners

(732) 247-5555 / <https://rutgers.campuslabs.com/engage/organization/scarletlisteners>

Free and confidential peer counseling and referral hotline, providing a comforting and supportive safe space.

Other Information:

During severe weather conditions, class cancellation information is available on the recorded message system at (732) 932-7799, or by following links at the Rutgers web site, www.rutgers.edu.

Rutgers University Policies:

A typical reference for Rutgers University policies that will be used in the conduct of this course is pp. 492-500 in Rutgers, The State University of New Jersey, Campus at New Brunswick. New Brunswick Undergraduate Catalog. 1997-1999. New Brunswick.

All sections of this discussion on policy are of vital importance to you as a Rutgers University student; however for the purposes of this course, please pay particular attention to sections on Registration, Attendance, Nondiscrimination, Policy Against Insult, Defamation, and Harassment, Sexual Harassment, Administrative Policy for Responding to Disruptions, Academic Integrity, and the University Student Disciplinary Hearing Procedure.

Should you have any questions about Rutgers University policies, please contact the personnel listed in the current Undergraduate Catalog.