

SYLLABUS – SPRING 2021

ECON 200 Section B and C: Energy Economics

ECON 200 B: Online: Tu: 8:00-9:25am; Th: 8:00-9:20am

ECON 200 C: Online: Tu: 9:35-11:00am; Th: 9:30-10:50am

<https://stolaf.zoom.us/j/93328515949> : Meeting ID: 933 2851 5949

Instructor	:	Douglas Mugabe
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Office Hours	:	M: 2-3pm; T: 11:30-12:30pm; Th: 12-1pm; or by appointment https://stolaf.zoom.us/j/93089043627 : Meeting ID: 930 8904 3627

Course Description

Prerequisite: ECON 121 or equivalent. This course focuses on a variety of energy related topics from an economics perspective. Topics will include; energy sources and energy prices, energy demand and energy supply, non-renewable and renewable energy development, the economics of renewable energy, electricity markets and regulation, energy and the environment, climate change, environmental impacts of energy consumption and production and energy policy.

Course Outcomes

Students will: (1) Demonstrate an understanding of the main issues and trends in energy economics; (2) Develop and improve the ability to use economic tools and methods to answer questions in energy economics; (3) evaluate various energy policies in relation to addressing the need for energy resources while considering potential negative externalities associated with production and consumption of energy; (4) analyze and critique domestic and international energy policies and (5) apply an understanding of economic efficiency vs equity as the two concepts pertain to tangible and intangible economic benefits and costs of energy production and consumption

Course Texts

There is **No Required Text** in this class, however I would **recommend** the following book;

1. Nersesian, R. (2014). Energy for the 21st century: a comprehensive guide to conventional and alternative sources. Routledge.

I will also use materials from the following texts (copies/notes will be made available)

2. Bradford, T. (2018). The Energy System: Technology, Economics, Markets, and Policy. MIT Press.
3. Bhattacharyya, S. C. (2019). Energy economics: concepts, issues, markets and governance. Springer Nature.
4. Schwarz Peter M. (2018). Energy Economics. Routledge.

The following free pdf text is for the review of economic concepts

5. Greenlaw, Steven, et al. (2020). Principles of Economics. OpenStax. <https://openstax.org/details/books/principles-economics-2e>.

Course Methods

Course material will be presented through lectures, in-class exercises and class discussions. Readings from lecture materials and supplemental readings, including recent publications may be used to support and reinforce lectures. The progress of student understanding will be measured through reading response assignments, group assignments and presentations, class participation, quizzes and exams.

General Course Policies and Expectations

- (1) **Late/Absence Policy:** Students should plan to attend every class. Video cameras should be turned **ON** at all times during class meetings, otherwise you will be considered absent. There are no make-up opportunities for homework assignments or tests/quizzes without **verification** of unavoidable circumstances that are presented to me **prior to the exam/quiz or homework due date**. **NOTE:** Consistent with St. Olaf College guidelines, students absent from regularly scheduled exams because of authorized College activities will have the opportunity to take them at an alternate time.
- (2) **Communication and appointments:** Let's meet (virtually) during office hours if you have questions and comments about the lecture. However, the best time to ask questions is during the class! That said, emails will be responded to in a timely manner, in most cases within a few hours. However, if emails are sent outside of normal business hours, I may not respond until the next day. Compose emails in a professional manner that reflects your communication skills that you will use during your successful careers. It is helpful to reference the course (ECON 200) in the subject line or somewhere within the text and to provide your full name. Students should also check the syllabus prior to contacting me with questions related to exam dates, make-up policies, or other course policy related questions. Students should check their school email regularly as email will be my primary form of mass communication with the class.
- (3) **Preparedness and class participation:** Reading the material before coming to class is beneficial to understanding the material. Participation in class, where appropriate, is both expected and welcome. Asking questions in class is beneficial to both the instructor and other students.
- (4) **Class disruptions:** Engaging in private conversations, reading materials unrelated to the class, leaving the classroom unnecessarily, or any other activity that creates negative externalities for others in the class should be avoided. This includes use of electronic devices in the classroom in a manner that is not consistent with the educational process.
- (5) **Cell phones, laptop computers, and other electronic devices:** As this is the year 2020, taking notes on a laptop is acceptable. However, if it becomes apparent that laptop usage has become a distraction, this courtesy will be revoked. Cell phones are not allowed during class, they distract the instructor and your colleagues.

Plagiarism and Academic Integrity:

The integrity of the classes offered by any academic institution solidifies the foundation of its mission and cannot be sacrificed to expediency, ignorance, or blatant fraud. Therefore, instructors will enforce rigorous standards of academic integrity in all aspects and assignments of their courses. For the detailed policy of St. Olaf College regarding the definitions of acts considered to fall under academic dishonesty and possible ensuing sanctions, please visit

<https://wp.stolaf.edu/thebook/academic/integrity/>. Should you have any questions about possibly improper research citations or references, or any other activity that may be interpreted as an attempt at academic dishonesty, please see your instructor before the assignment is due to discuss the matter. See also the description of St. Olaf's honor system at: <https://wp.stolaf.edu/honorcouncil/>.

Equity and Inclusivity:

In keeping with St. Olaf College's mission statement, this class strives to be an inclusive learning community, respecting those of differing backgrounds and beliefs. As a community, we aim to be respectful to all citizens in this class, regardless of race, ethnicity, religion, gender or sexual orientation. More information about equity and inclusion is available at <https://wp.stolaf.edu/equity-inclusion/>. This course affirms people of all gender expressions and gender identities. If you go by a different name than what is on the class roster, please let me know. Using correct gender pronouns is important to me, so you are encouraged to share your pronouns with me and correct me if a mistake is made. If you have any questions or concerns, please do not hesitate to contact me.

Code of Conduct:

The Code of Conduct exists to educate students in understanding their rights and responsibilities as members of a safe, civil, and ethical academic community. Though formal in language, the manner in which students experience the judicial process involves respect, due process, and education designed to prevent and mitigate harm. Please read more on <https://wp.stolaf.edu/thebook/code-of-conduct/>.

Regarding mask wearing and maintaining physical distancing:

It is compulsory to mask up when attending this class or any other building at this college according to St. Olaf College regulations. There are consequences of failure to wear a mask or maintain physical distance in the classroom. If you attend the class with no mask, the instructor will ask you to leave the class, and to return when you are wearing one. If a student refuses to wear a mask and refuses to leave the room, the class will be dismissed, and Student Life will be notified to address this violation of Student Code.

The Writing Desk

The Writing Desk: Peer tutors at the Writing Desk offer help with any paper, in any class, at any stage of the writing process. You can sign up for an appointment online or drop in for online tutoring Sundays 12pm-10pm, Mondays-Thursdays 9am-10pm, and Fridays 9am-5pm. All Writing Desk appointments will take place virtually on Google Meet. Learn more at <http://wp.stolaf.edu/caas/writing-help/>. These videos introduce the Writing Desk: [Writing Desk video 1](#) or [Writing Desk video 2](#).

The Speaking Space

Speaking Tutors help students effectively speak and listen within academic conversations, from participating in or leading class discussions to preparing and rehearsing formal presentations. You can sign up for an appointment online or drop in Sundays-Thursdays 7-8:30pm. All

Speaking Space appointments will take place virtually on Google Meet. Learn more at <https://wp.stolaf.edu/academic-support/speaking-center/>.

St. Olaf Pride Statement

As an Ole, I will practice: PASSION for learning and pursuit of vocation; RESPECT for the worth and dignity of all people; INTEGRITY at all times, in all circumstances; DEDICATION to a life of service; and ENGAGEMENT with my community and the world.

Accommodations

I am committed to supporting the learning of all students in my class. If you have already registered with Disability and Access (DAC) and have your letter of accommodations, please meet with me as soon as possible to discuss, plan, and implement your accommodations in the course. If you have or think you have a disability (learning, sensory, physical, chronic health, mental health or attentional), please contact Disability and Access staff at 507-786-3288 or by visiting wp.stolaf.edu/academic-support/dac.

Mental Health

I greatly value your experience in this class, and it is my duty to facilitate a safe, caring, and productive learning environment. I recognize that you may experience a range of emotional, physical, and/or psychological issues, both in and out of the classroom, that may distract you from your learning. If you are experiencing such issues, please do not hesitate to come see me- I am here to listen. We can also discuss what further resources might be available to you.

Potential Change:

It may be necessary to modify this course during the semester. I reserve the right to revise the syllabus and alter this course at my discretion. I will announce any changes in class and/or post changes online. I am committed to making course content accessible to all students. If English is not your first language and this causes you concern about the course, please speak with me.

Grading

Grading Summary

Activity	Points
Reading Responses	10%
Homeworks	15%
Class participation and Attendance	5%
Class Quizzes	15%
Group Assignment	15%
Short Presentations	10%
Exams	30%
Total	100%

Final grades will be assigned according to the following scale:

Grade	Points
A	90-100%
B	80-89%
C	70-79%
D	60-69%
F	0-59%

1. **Assignment (25%):** Three reading responses and three homework assignments will be administered. ***Late assignments will be penalized (10% loss in points per day).***
2. **Short Presentations (10%):** There are at least two individual short presentations (+/-5 minutes) per student on subject areas to be assigned.
3. **Class Quizzes (15%):** At least four short quizzes will be administered, after every two weeks and your best four will be applied to your final grade.
4. **Class Participation and attendance (5%):** Participation in class, where appropriate, is both expected and welcome. In particular, asking questions in class is beneficial to both the instructor and other students. Class participation and class attendance will be tracked during the semester to determine this portion of the grade.
5. **Group assignment (15%):** Each student will be randomly assigned to one of the six groups. Each group will be required to create a 45-minute PowerPoint presentation covering a technical and economic assessment of the historic and current use, production, reserves/capacity, cost, government policies, and environmental challenges related to one of six energy sources i. Coal, ii. Oil, iii. Natural gas, iv. Nuclear v. Water and hydropower vi. Wind, solar and biofuels. Group PowerPoint slides will be due on March 14 at 11:59pm CT. Grades will be based on group and individual performance. Final presentations will be posted on moodle.
6. **Exams (30%):** There will be a Midterm on 2 April and a **Final exam** scheduled on May 25 (for ECON 200 Section B) and May 20 (for ECON 200 Section C) at 9-11am. The exam will consist of short answers and essay questions. A review session will be held prior to each exam. Please bring a calculator for the exam.
7. **Extra Credit:** Outside class interactions including attending webinars, reading newspapers and research papers and watching online videos as highlighted by the instructor will be credited. You should provide a short summary about the materials covered. Please note that I do not “bump up” grades at the end of the semester.

Technical Support

For technical assistance, ITS offers support every day. Please contact IT Helpdesk at <https://wp.stolaf.edu/it/helpdesk/>. Phone: Ext. 3830 (507-786-3830)

Course Outline

Below is a tentative course outline. Dates/topics may be adjusted depending on the progress of the class. Announcements related to any changes will be communicated in class or via email.

Dates	TENTATIVE SCHEDULE & Readings	Activity due at 11:59pm CT
Week 1 & 2 15-26 Feb	Introduction and Background <ul style="list-style-type: none"> - The significance of Energy - Review of Economic Concepts 	Presentation 1 choice: Feb 16 Presentation 2 choice: Feb 28 Reading Response 1: due Feb 28
Week 3 1-5 Mar	Energy demand, Supply and Economic Growth <ul style="list-style-type: none"> - Economics of depletable resources - Energy supply and demand Analysis - Market Failures and resource Markets 	Quiz 1: on Mar 4 Reading Response 2: due Mar 7
Week 4 8-12 Mar	Electricity Markets in the US <ul style="list-style-type: none"> - Characteristics of electricity markets - Regulated and natural monopoly - Levelized cost of electricity 	Group PowerPoint: due Mar 14
Week 5 15-19 Mar	Economics of Oil <ul style="list-style-type: none"> - Supply and demand for oil resources 	Group 1 Presentation: Mar 16 Homework 1: due March 19
Week 6 22-26 Mar	Economics of coal and natural gas <ul style="list-style-type: none"> - Supply and demand for coal and natural gas - Using coal vs natural gas as inputs in electricity generation 	Group 2 & 3 Presentations on Mar 23 & 25 respectively Quiz 2: on Mar 25
Week 7 29Mar-2Apr	Economics of nuclear power <ul style="list-style-type: none"> - Supply and demand for nuclear power - Benefit and costs of installing a nuclear power facility 	Group 4 Presentation: Mar 30 Midterm: on Apr 1
Week 8 5-9Apr	Economics of renewable energy (Water and hydropower) <ul style="list-style-type: none"> - Supply and demand of water and hydropower resources 	Group 5 Presentation: Apr 6 Homework 2: due on Apr 9
Week 9 12-16Apr	Economics of renewable energy (Wind, Solar and Biomass) <ul style="list-style-type: none"> - Supply and demand for wind, solar power and biomass - Investment in renewable energy 	Group 6 Presentation: Apr 13 Quiz 3: on Apr 15 Presentation 3 choice: Apr 16
Week 10 & 11 19-30 Apr	Energy, Environmental Externalities & Climate Change <ul style="list-style-type: none"> - Energy production/consumption and climate change - Energy development in developing vs developed nations 	No Class (Rest): on Apr 27 Homework 3: due Apr 30 Reading Response 3: due May 2
Week 12 & 13 3- 14 May	Energy policy, security and the future <ul style="list-style-type: none"> - Risk and security of energy supply from various sources - Volatility in energy prices - Institutional frameworks in addressing environmental harm 	Quiz 4: on May 6
Week 14 & 15 17-25 May	Revision and Preparation for the Final Exam Last day of classes: 18 May & Reading Day: 19 May wp.stolaf.edu/registrar/spring-semester-final-exam-schedule	Revision – May 18 Final Exam May 20/25, 9-11am

Required Readings – ordered by weekly topic

Weeks 1 & 2: Introduction and Background

Krautkraemer, J. A. (2005). Economics of natural resource scarcity: The state of the debate (No. 1318-2016-103362).

Smil, V. (2002). Energy resources and uses: a global primer for the twenty-first century. *Current History*, 101(653), 126.

Smil, V. (2000). Energy in the twentieth century: resources, conversions, costs, uses, and consequences. *Annual Review of Energy and the Environment*, 25(1), 21-51.

United States Energy Information Administration, "Annual Energy Review 2021," Section — Energy Overview, <https://www.eia.gov/totalenergy/data/monthly/pdf/mer.pdf>

United States Energy Information Administration, International Energy Outlook 2016, "World Energy Demand and Economic Outlook," [https://www.eia.gov/outlooks/ieo/pdf/0484\(2016\).pdf](https://www.eia.gov/outlooks/ieo/pdf/0484(2016).pdf)

Week 3: Energy Demand, Supply, and Economic Growth

[Frankel, J. \(2010\). "The Natural Resource Curse: A Survey," NBER Working Paper No. 15836, https://www.nber.org/system/files/working_papers/w15836/w15836.pdf](https://www.nber.org/system/files/working_papers/w15836/w15836.pdf)

Krautkraemer, J. A. (1998). Nonrenewable resource scarcity. *Journal of Economic literature*, 36(4), 2065-2107.

Krautkraemer, J. A., & Toman, M. (2003). Fundamental economics of depletable energy supply (No. 1318-2016-103082).

Holahan, W. L., & Kroncke, C. O. (2004). Teaching the Economics of Non-renewable Resources to Undergraduates. *International Review of Economics Education*, 3(1), 77-87. <https://www.economicsnetwork.ac.uk/iree/i3/holahan.htm>

Medlock III, K. B., & Soligo, R. (2001). Economic development and end-use energy demand. *The Energy Journal*, 22(2).

Week 4: Electricity Markets

Borenstein, S. (2002). The trouble with electricity markets: understanding California's restructuring disaster. *Journal of economic perspectives*, 16(1), 191-211.

Borenstein, S. (2012). The private and public economics of renewable electricity generation. *Journal of Economic Perspectives*, 26(1), 67-92.

Joskow, P. L. (2000). Deregulating and regulatory reform in the US electric power sector. https://dspace.mit.edu/bitstream/handle/1721.1/44967/2000-003.pdf?sequence=1&origin=publication_detail

Joskow, P. L., & Kohn, E. (2002). A quantitative analysis of pricing behavior in California's wholesale electricity market during summer 2000. *The Energy Journal*, 23(4).

Mugabe, D., Elbakidze, L., & Zaynutdinova, G. (2020). Elasticity of substitution and technical efficiency: evidence from the US electricity generation. *Applied Economics*, 52(16), 1789-1805.

Week Five: Oil

Adelman, M. A. (2004). The real oil problem. *Regulation*, 27, 16.

[Gordon, D. \(2012\). Understanding unconventional oil. Carnegie Endowment for International Peace. www.carnegieendowment.org/files/unconventional_oil.pdf](http://www.carnegieendowment.org/files/unconventional_oil.pdf)

Maugeri, L. (2012). Oil: the next revolution. Belfer Center for Science and International Affairs Discussion Paper, (2012-10). <https://www.valueplays.net/wp-content/uploads/Maugeri-Leonardo-harvard.edu-Oil-The-Next-Revolution-6-25-2012.pdf>

McNally, R., & Levi, M. (2011). A crude predicament: The era of volatile oil prices. *Foreign Affairs*, 100-111.

Watkins, G. C. (2006). Oil scarcity: What have the past three decades revealed?. *Energy Policy*, 34(5), 508-514.

Weeks Six: Coal and Natural Gas

Freme, F. (2009). US Coal supply and demand: 2009 review. *Electric Power*, 922(937.8), 946-8.

Moniz, E. J., Jacoby, H. D., Meggs, A. J., Armstrong, R. C., Cohn, D. R., Connors, S. R., ... & Kaufman, G. M. (2011). *The future of natural gas*. Cambridge, MA: Massachusetts Institute of Technology.

Katzer, J., Moniz, E. J., Deutch, J., Ansolabehere, S., & Beer, J. (2007). *The future of coal: an interdisciplinary MIT study*. Technical report, Massachusetts Institute of Technology, Cambridge, MA.

Deutch, J., Moniz, E. J., Ansolabehere, S., Beer, J., Ellerman, D., Friedmann, J., ... & Steinfeld, E. (2007). The future of coal—An interdisciplinary MIT study. Massachusetts Institute of Technology. Digital document available at <http://web.mit.edu/coal>.

Week Seven: Nuclear

Deutch, J., Kanter, A., Moniz, E., & Poneman, D. (2004). Making the world safe for nuclear energy. *Survival*, 46(4), 65-79.

Davis, L. W. (2012). Prospects for nuclear power. *Journal of Economic perspectives*, 26(1), 49-66.

[Moniz, E. J. \(2003\). The future of nuclear power-An interdisciplinary MIT study \(No. INIS-XA--653\). <http://web.mit.edu/nuclearpower/>](http://web.mit.edu/nuclearpower/)

Week Eight: Water and Hydropower

Gleick, P. H., Cooley, H., Famiglietti, J. S., Lettenmaier, D. P., Oki, T., Vörösmarty, C. J., & Wood, E. F. (2013). Improving understanding of the global hydrologic cycle. In *Climate science for serving society* (pp. 151-184). Springer, Dordrecht.

Lee, Y., Yoon, T., & Shah, F. A. (2011). Economics of integrated watershed management in the presence of a dam. *Water Resources Research*, 47(10).

Palmieri, A., Shah, F., & Dinar, A. (2001). Economics of reservoir sedimentation and sustainable management of dams. *Journal of environmental management*, 61(2), 149-163.

Week Nine: Wind and Solar

Barradale, M. J. (2010). Impact of public policy uncertainty on renewable energy investment: Wind power and the production tax credit. *Energy Policy*, 38(12), 7698-7709.

Lüthi, S., & Prässler, T. (2011). Analyzing policy support instruments and regulatory risk factors for wind energy deployment—A developers' perspective. *Energy Policy*, 39(9), 4876-4892.

Madlener, R., & Mathar, T. (2009). *Development Trends and Economics of Innovative Solar Power Generation Technologies: A Comparative Analysis*.

McGowan, J. G., & Connors, S. R. (2000). Windpower: a turn of the century review. *Annual Review of Energy and the Environment*, 25(1), 147-197.

Stagnaro, C., & Bakst, D. (2010). Costs of Nuclear v. Solar Power.

Week Ten and Eleven: Energy, Climate Change, and Environmental Externalities

[Kaplow, L. \(2010\). Taxes, permits, and climate change \(No. w16268\). National Bureau of Economic Research. http://www.nber.org/papers/w16268.](http://www.nber.org/papers/w16268)

Nordhaus, W. D. (2007). A review of the Stern review on the economics of climate change. *Journal of economic literature*, 45(3), 686-702.

[United State Environmental Protection Agency, "Climate Change Indicators: US Greenhouse Gas Emissions," https://www.epa.gov/climate-indicators/climate-change-indicators-us-greenhouse-gas-emissions.](https://www.epa.gov/climate-indicators/climate-change-indicators-us-greenhouse-gas-emissions)

[EPA. Inventory of Greenhouse Gas Emissions. https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2015](https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2015)

Week Twelve and Thirteen: Energy Policy, Security, and the Future

Kenny, R., Law, C., & Pearce, J. M. (2010). Towards real energy economics: energy policy driven by life-cycle carbon emission. *Energy Policy*, 38(4), 1969-1978.

McDonald, S., Robinson, S., & Thierfelder, K. (2006). Impact of switching production to bioenergy crops: The switchgrass example. *Energy economics*, 28(2), 243-265.

[Metcalf, G. \(2006\). "Energy Conservation in the United States: Understanding its Role in Climate Policy," MIT Joint Program on the Science and Policy of Global Change, Report No. 138. http://web.mit.edu/globalchange/www/MITJPSPGC_Rpt138.pdf.](http://web.mit.edu/globalchange/www/MITJPSPGC_Rpt138.pdf)

Palmer, K., & Burtraw, D. (2005). Cost-effectiveness of renewable electricity policies. *Energy economics*, 27(6), 873-894.

Portney, P. R., Parry, I. W., Gruenspecht, H. K., & Harrington, W. (2003). Policy watch: the economics of fuel economy standards. *Journal of Economic perspectives*, 17(4), 203-217.

Stern, R. (2006). Oil market power and United States national security. *Proceedings of the National Academy of Sciences*, 103(5), 1650-1655.

Toman, M. A. (1993). The economics of energy security: Theory, evidence, policy. *Handbook of natural resource and energy economics*, 3, 1167-1218.