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## ECO 414S/1960S: Energy and Regulation Winter 2022

### COURSE DESCRIPTION:

This course provides a general treatment of the economics of energy markets and the use of regulation in addressing environmental and other issues arising in these markets. A central theme is the search for an appropriate balance between market forces and regulatory/government intervention. A related objective is the development of a framework for understanding the public discourse on energy and the environment. Familiarity with tools of microeconomics and statistics is essential. Topics include renewable energy and storage, electricity markets, global warming, carbon pricing, hydrocarbons (oil, natural gas, coal) and fracking, the politics and geopolitics of energy.

### TIME AND LOCATION:

- Mondays 2-5, for location please check the University course website.

### EVALUATION: late penalties are 10% per day

Midterm	Mon Feb 14, 2022	25%
Paper Outline	Fri Feb 25, 2022	5%
Assignment	Fri Mar 11 2022	15%
Paper	Fri Apr 8, 2002	30%
Final exam	Exam Period	25%

### RESEARCH PAPER:

- a. Undergraduate papers are to critically analyze an energy topic of interest.
- b. Graduate students are required to include some empirical analysis in their paper.

**Paper Outline:** You are responsible for selecting the topic. It should be on energy and related areas such as the environment, sustainability, regulation, security, politics/geopolitics, technology... You might consider browsing publications such as *Economics of Energy and Environmental Policy*, *Energy Policy*, *Energy Economics* and *The Energy Journal* ... to name a few. Please submit the outline electronically through Quercus. Your two-page outline must contain the following:

- a. Title and abstract not exceeding 250 words. Include a thesis statement **in bold**.
- b. A list of key references (be sure to do a citation search)
- c. An outline of how your analysis will be conducted.
- d. Graduate students will have empirical analysis in their paper:
  - i. please indicate the anticipated results of your analysis
  - ii. a spreadsheet with any data that you will be using.

**Paper:** Please submit the paper electronically through Quercus in portable document format (pdf).

- a. Undergraduate papers should be approximately 3000 words. Graduate papers should be approximately 4000 words. This does not include the abstract, references, tables and graphics.
- b. The paper should follow one of the following styles: APA, Chicago or MLA.
- c. The structure of the paper must be as follows:

- i. Cover Page – Title of paper, name and student number, date submitted, word count and an abstract which is not to exceed 250 words.
  - ii. Introduction – the first paragraph must contain your thesis statement.
  - iii. Literature Review
  - iv. Analysis
  - v. Conclusions
  - vi. References – there should be a minimum of ten relevant items. At least five should be from peer-reviewed publications.
- d. The “Analysis” section is a critical part of the paper. You should set out the evidence to support your thesis statement. You may want to critique positions taken by others.
  - e. The “Conclusions” section should discuss policy implications.
  - f. For graduate students, the “Analysis” section should include a description of the data and an explanation of empirical work that was conducted.

You are reminded that plagiarism and cheating are **serious** academic offences with potentially serious penalties. **Plagiarism detection tools will be used on submitted work, including assignments, tests, exams and papers.** The purpose is to check for textual similarity and to detect possible plagiarism. The University of Toronto’s Code of Behaviour on Academic Matters outlines the behaviours that constitute academic dishonesty and the processes for addressing academic offences ([www.governingcouncil.utoronto.ca/policies/behaveac.htm](http://www.governingcouncil.utoronto.ca/policies/behaveac.htm)).

The only generally acceptable reason for missing a test, exam or assignment is illness. Normally, a medical certificate is required under such circumstances. In present circumstances we will abide by University policies which may not require such certificates.

### IN THE NEWS

Students will follow current issues in energy by signing up for news alerts (e.g., through Google Alerts). Subscribe to MIT Energy Initiatives updates by visiting <http://energy.mit.edu/news/>. Classes will usually begin with a brief discussion of the week’s developments in energy. Students should regularly visit MIT Technology Review <http://www.technologyreview.com/> to review advances in energy. For insightful commentary on a range of issues, visit Project Syndicate which is available through our library system through <https://login.library.utoronto.ca/index.php?url=https://www.project-syndicate.org/>.

### COURSE MATERIALS

#### Readings<sup>1</sup>

1. Daniel Yergin, *The New Map: Energy, Climate and the Clash of Nations*, Penguin Press, 2020.
2. Richard Muller, *Energy for Future Presidents, The Science Behind the Headlines*, Norton 2012.
3. Jaccard, M. *The Citizen’s Guide to Climate Success*, Cambridge University Press, 2020. Entire pdf version available at <https://www.cambridge.org/core/books/citizens-guide-to-climate-success/49D99FBCBD6FCACD5F3D58A7ED80882D>
4. Jeffrey Sachs, *The Age of Sustainable Development*, Columbia University Press, 2015. Hardcopy and Kindle editions available. Also available electronically through UofT Libraries. Chapter summaries available at <https://cup.columbia.edu/extras/supplement/sachs-9780231173148>.

#### Additional References and Data Sources:

1. *Encyclopedia of Energy*, ed. Cutler Cleveland. Available electronically through UofT Libraries.

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<sup>1</sup> In some cases Kindle editions are available and usually less costly than hardcopy. You do not need a Kindle device as Kindle books can be read on Macs and PCs.

2. Carol Dahl, *International Energy Markets*, PennWell, 2004, updated edition 2015.
3. International Energy Agency <http://www.iea.org> *Energy Statistics Manual, Electricity Information, IEA Statistics, Key World Energy Statistics*.
4. Canada Energy Regulator: <https://www.cer-rec.gc.ca/index-eng.html> (formerly the National Energy Board).
5. Vaclav Smil, *Energy: Beginner's Guide*, 2006. Kindle version available.
6. BP (formerly British Petroleum) [www.bp.com/statisticalreview](http://www.bp.com/statisticalreview), *Statistical Review of World Energy, Statistical Review Workbook* (Excel spreadsheet).
7. Lawrence Livermore Laboratories. Energy and Carbon Flow Charts.
8. World Resources Institute – GHG gas data, slide presentation, papers, annual “Stories to Watch”.
9. Economics in the Age of Covid-19 –Joshua Gans, MIT Press, April 2020. Kindle Edition available on Amazon.ca. An earlier open access draft is available at <https://economics-in-the-age-of-covid-19.pubpub.org/>.
10. Bruce Usher, *Renewable Energy: A Primer for the Twenty-First Century*, Columbia University Press, 2019. Available electronically through University of Toronto libraries. Also, hardcopy and Kindle versions available
11. Jaffe, Amy Myers. *Energy's Digital Future: Harnessing Innovation for American Resilience and National Security*, New York Chichester, West Sussex: Columbia University Press, 2021. <https://doi-org.myaccess.library.utoronto.ca/10.7312/jaff19682>

### LECTURE TOPICS AND READINGS

1. Background and Introduction
  - a. Yatchew, A. 2014: “Economics of Energy: Big Ideas for the Non-Economist”, *Energy Research and Social Science*, 1:1, 74-82.
  - b. Muller, Parts I, II
  - c. Yergin, Introduction, *America’s New Map*, Ch. 1-8.
  - d. Sachs – Ch. 1, 3, 4, 6, 12, 14
2. Energy in World History
  - a. Vaclav Smil, *Energy and Civilization: A History*, 2017, MIT Press. Chronology of Energy-Related Developments, Addenda.
3. Economic Tools: Theory and Empirical Analysis.
  - a. Theory: Refer to your texts in microeconomics to review the following subject areas: supply/demand analysis; consumer and producer theory; industry structures – monopoly, oligopoly, monopolistic competition, perfect competition; game theory; externalities; public goods; taxes and deadweight loss.
  - b. Empirical Analysis Examples
    - i. Dimitropoulos, D. and A. Yatchew 2017, “Discerning Trends in Commodity Prices”, *Macroeconomic Dynamics*, vol.22, Special Issue 3, Dynamics of Oil and Commodity Prices, 683-701, doi:10.1017/S1365100516000511. . **Eco 3502 students only**
    - ii. Dimitropoulos, D. and A. Yatchew 2017, “Is Productivity Growth in Electricity Distribution Negative? An Empirical Analysis Using Ontario Data”, *The Energy Journal*, 38:2,175-200. **Eco 3502 students only**
    - iii. Yatchew, A. and J.A. No, 2001: “Household Gasoline Demand in Canada”, *Econometrica*, 1697-1710. **Eco 3502 students only**

4. Geopolitics, Politics and Policy
  - a. Yergin, Russia's Map Ch. 9-16, China's Map Ch.17-25, Maps of the Middle East Ch. 26-36, Conclusion.
  - b. Muller, Part V Advice for Future Presidents.
  - c. "2018 Diplomat of the Year Chrystia Freeland: Read the Transcript", *Foreign Policy*, June 14, 2018, <https://foreignpolicy.com/2018/06/14/2018-diplomat-of-the-year-chrystia-freeland-read-the-transcript/>
  - d. Jaffe, Chapter 3, China's Energy Strategy
  
5. Canadian Energy Challenges
  - a. Pineau, Pierre-Olivier "Canadian Energy in Multiple Crises: From Pipeline and Climate to Covid-19", Slides from webinar, April 15, 2020.
  - b. U.S. Energy Information Administration, "Canada Country Analysis Brief". Updated periodically on the EIA web-site. <https://www.eia.gov/international/analysis/country/CAN>
  - c. Competition Bureau, "Merger Enforcement Guidelines" <https://www.competitionbureau.gc.ca/eic/site/cb-bc.nsf/eng/03420.html>
  
6. Global Warming and Other Externalities
  - a. Robert Stavins, "The Problem of the Commons: Still Unsettled After 100 Years", *American Economic Review*, 2011, 81-108.
  - b. Brander, J. A., and Taylor, M. S. "The Simple Economics of Easter Island: A Ricardo–Malthus model of renewable resource use." *Am. Econ. Rev.* 1998, 88(1), 119–138.
  - c. Nordhaus, William, "Climate Clubs: Overcoming Free-riding in International Climate Policy", *American Economic Review* 2015, 105(4): 1339–1370.
  - d. Nordhaus, William, "The Climate Club: How to Fix a Failing Global Effort", *Foreign Affairs*, May/June 2020.
  - e. Yatchew, A. 2016, "Rational vs. 'Feel-Good' Carbon Policy – Transferability, Subsidiarity and Separation" *Energy Regulation Quarterly*, 4:3, 31-40.
  - f. Climate Leadership Council, February 2017, "The Conservative Case for Carbon Dividends", available at <https://www.clcouncil.org/media/2017/03/The-Conservative-Case-for-Carbon-Dividends.pdf> .
  - g. Yergin Climate Map Ch. 41-46.
  
7. Electricity and Renewables
  - a. Yergin Roadmap Ch. 37-40.
  - b. Muller, Part III
  - c. MIT Energy Initiative, "Utility of the Future", 2016, Executive Summary, <http://energy.mit.edu/research/utility-future-study/>.
  - d. Yatchew, A. 2019, "How Scalability is Transforming Energy Industries" *Energy Regulation Quarterly*, 7:2, 35-44.
  - e. Richard Green and Adonis Yatchew 2012: "Support Schemes for Renewable Energy: An Economic Analysis", *Economics of Energy & Environmental Policy*, 1, 83-98.
  - f. Scott P. Burger, Jesse D. Jenkins, Carlos Batlle, Ignacio J. Pérez-Arriaga 2019 "Restructuring Revisited Part 1: Competition in Electricity Distribution Systems" *The Energy Journal*, 40: 3, 31-54. **Eco 3502 students only**
  - g. Scott P. Burger, Jesse D. Jenkins, Carlos Batlle, Ignacio J. Pérez-Arriaga 2019 "Restructuring Revisited Part 2: Coordination in Electricity Distribution Systems" *The Energy Journal*, 40: 3, 55-76. **Eco 3502 students only**

8. Oil, Natural Gas and Coal

- a. Bil McKibben, "Why Not Frack?", *New York Review of Books*, March 8, 2012. Reply by John Deutch, *New York Review of Books*, April 26, 2012.
- b. James Hamilton, "Historical Oil Shocks," in *Routledge Handbook of Major Events in Economic History*, pp. 239-265, edited by Randall E. Parker and Robert Whaples, New York: Routledge Taylor and Francis Group, 2013.
- c. Lutz Kilian L. (2015) Energy Price Shocks. In: Palgrave Macmillan (eds) *The New Palgrave Dictionary of Economics*. Palgrave Macmillan, London. [https://doi.org/10.1057/978-1-349-95121-5\\_3008-1](https://doi.org/10.1057/978-1-349-95121-5_3008-1)