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ECO 314F: Energy and the Environment
Summer 2023

COURSE DESCRIPTION:
The war on Ukraine has underscored the role of energy in geopolitics. Prior to this, the Covid-19 pandemic had significant impacts on energy markets. Throughout, climate change continues to be a most pressing issue with evidence of little progress. This course surveys important features of energy markets and related environmental challenges in a rapidly changing world. One of the central objectives is to provide an understanding of the key economic tools needed to analyse these markets and to develop an appreciation for the political and geopolitical centrality of energy issues. A related objective is the development of a framework for understanding the public discourse on energy and the environment. Topics include the hydrocarbon economy (oil, natural gas, and coal), electricity markets, global warming and other externalities, renewable energy and conservation, carbon pricing, sustainability and the geopolitics of energy.

LECTURES AND EVALUATIONS
Lectures and tutorials are conducted synchronously online. These are recorded and posted online. Tests and exams are in person. You must have access to a computer or a tablet with a reliable internet connection in order to participate, download and upload materials, watch posted videos and write tests at specified times.

RELATED COURSES: ECO 414S Energy and Regulation; ENV462H1: Energy and Environment: Economics, Politics, and Sustainability. ECO 314F is not an exclusion to either of these courses.

EVALUATION:

Midterm	25%	Fri May 26, 2023 (during class)
Assignment	15%	Fri Jun 9, 2023, by 11:59 PM
Paper	35%	Sun Jun 18, 2023, by 11:59 PM
Exam	25%	Exam Period

Late penalties on assignments and papers will be 10% per day (e.g., if the submission is worth 100 marks, the daily penalty will be 10 marks).

The Assignment must be submitted as a single pdf document through Quercus with answers to all questions and their sub-parts in the original order and clearly numbered for easy identification. Answers numbered incorrectly will not be given credit. You are required to submit solutions to all questions. **However, only a subset will be graded.** The list of questions that are to be graded will not be revealed in advance.

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 double-spaced 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.

The Paper will be submitted electronically through Quercus in portable document format (pdf). The paper should be about 3000 words. This does not include references, tables and graphics.

a. The paper should follow one of the following styles: APA, Chicago or MLA.
b. 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. It must include your **thesis statement in bold** which takes a position (e.g., "This paper will examine…" is **not** a thesis statement. "This paper finds that the cessation of Russian natural gas imports to Germany by the end of 2022 is feasible." is a thesis statement.
    ii. Introduction – the first paragraph should repeat your thesis statement in bold.
    iii. Literature Review
    iv. Analysis
    v. Conclusions
    vi. References – there should be at least seven relevant items. A minimum of three should be from peer-reviewed publications.
c. The "Analysis" section is a critical part of the paper. You should set out the evidence and argument to support your thesis statement. You may want to critique positions taken by others.
d. The "Conclusions" section should discuss policy implications.

Academic Integrity: 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). See also "Academic Integrity" link on the right side of the course Quercus page.

> **"Normally, students will be required to submit their course essays to the University's plagiarism detection tool for a review of textual similarity and detection of possible plagiarism. In doing so, students will allow their essays to be included as source documents in the tool's reference database, where they will be used solely for the purpose of detecting plagiarism. The terms that apply to the University's use of this tool are described on the Centre for Teaching Support & Innovation web site https://uoft.me/pdt-faq ."**
> **https://teaching.utoronto.ca/resources/plagiarism-detection/#conditions**

The knowing use of generative artificial intelligence tools, including **ChatGPT** and **other AI writing and coding assistants**, for the completion of, or to support the completion of, an examination, term test, assignment, or any other form of academic assessment is prohibited and may be considered an academic offense in this course.

Missed Evaluations: The only generally acceptable reason for missing a term test/exam/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.

Recordings: "Efforts will be made to record this course, including your participation, on video and whenever possible, will be made available to students in the course for viewing remotely. Course videos and materials belong to your instructor, the University, and/or other sources depending on the specific facts of each situation, and are protected by copyright. Do not download, copy, or share any course or student materials or videos without the explicit permission of the instructor."
https://teaching.utoronto.ca/resources/recording-of-lectures-and-class-sessions/

IN THE NEWS

Students are **required** to 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/. You will also be required to read assigned articles in the Globe and Mail, Washington Post, the BBC and the New York Times and other media. Through our library system you have access to an extensive database of many international newspapers.

COURSE OBJECTIVES

1. Broad overview of major areas of energy economics and related environmental issues.
2. Brief review of important economic tools used to analyse energy markets.
3. Understanding public discourse on energy and environmental debates, (e.g., decarbonization, fracking, renewable energy, markets v. regulation, geopolitics …).
4. Facility with data resources on energy and related environmental issues.

COURSE MATERIALS

1. Richard Muller, *Energy for Future Presidents*, Norton, 2012. Hardcopy and Kindle versions available.
2. 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
3. Daniel Yergin, *The New Map: Energy, Climate and the Clash of Nations*, Penguin Press, 2020. (Available electronically through UofT Libraries.)

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, http://dx.doi.org/10.1016/j.erss.2014.03.004 , available electronically through University of Toronto libraries.
    b. Muller, Part I, Ch. 1- 2., Part IV.
    c. Jaccard, Ch. 1.
    d. U.S. Energy Information Administration, "Canada Country Analysis Brief". Updated periodically on the EIA website https://www.eia.gov/international/analysis/country/CAN.

2. Milestones in Energy History
    a. Smil, Vaclav "World History and Energy" in *Encyclopedia of Energy*, Volume 6, 2004 Elsevier Inc. Available electronically through University of Toronto Libraries.

3. Brief Review of Economic Tools
    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; regulation and competition policy. See in particular: Competition Bureau Merger Enforcement Guidelines http://www.competitionbureau.gc.ca/eic/site/cb-bc.nsf/vwapj/cb-meg-2011-e.pdf/$FILE/cb-meg-2011-e.pdf

4. Geopolitics, Politics and Policy
    a. "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/
    b. Yergin, Russia's Map Ch. 9-16, China's Map Ch. 17-25, Maps of the Middle East Ch. 26-36, Conclusion.
    c. Muller, Part V Advice for Future Presidents.

5. Environmental Issues
    a. Brander, James, "Easter Island: Resource Depletion and Collapse", *Encyclopedia of Energy,* 2004 edited by Cutler Cleveland.
    b. Muller, Part I, Ch. 3 Global Warming and Climate Change.
    c. Jaccard, M. *The Citizen's Guide to Climate Success*, Cambridge University Press, 2020, Ch. 4,6, 10-12.
    d. Nordhaus, William, "The Pope & the Market", *New York Review of Books*, October 8 2015. http://www.nybooks.com/articles/archives/2015/oct/08/pope-and-market/
    e. Nordhaus, William, "The Climate Club: How to Fix a Failing Global Effort", *Foreign Affairs*, May/June 2020.
    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.

6. Electricity and Renewables
    a. Muller, Part II, Ch. 7, Part III, Ch. 8-11, 13, 15, 18.

7. Hydrocarbons – Oil, Natural Gas, Coal
    a. Muller, Part II, Ch. 4-6, Part III, Ch. 14.

ADDITIONAL REFERENCES, SOURCES AND READINGS

1. *Encyclopedia of Energy*, ed. Cutler Cleveland. Available electronically through UofT Libraries.
2. Carol Dahl, *International Energy Markets*, PennWell, 2004, updated edition 2015.
3. International Energy Agency http://www.iea.org Most recent documents are available electronically through the University of Toronto Libraries. *Energy Statistics Manual*, *Electricity Information, IEA Statistics, Key World Energy Statistics*.
4. Lawrence Livermore Laboratories. Energy and Carbon Flow Charts https://energy.llnl.gov/
5. International Energy Agency, energy flow charts https://www.iea.org/Sankey/
6. International Energy Agency, most recent documents are available electronically through the University of Toronto Libraries. See also http://www.iea.org/
7. Canada Energy Regulator: https://www.cer-rec.gc.ca/index-eng.html (formerly the National Energy Board).
8. BP (formerly British Petroleum) www.bp.com/statisticalreview, *Statistical Review of World Energy*, *Statistical Review Workbook* (Excel spreadsheet).
9. World Resources Institute – GHG gas data, slide presentation, papers, annual "Stories to Watch"
10. Freedom House https://freedomhouse.org/ -- annual country reports and Freedom House map https://freedomhouse.org/explore-the-map?type=fiw&year=2022.
11. Reporters Without Borders https://rsf.org/en/index
12. Human Rights Watch https://www.hrw.org/

13. Amnesty International https://www.amnesty.org/en/
14. Vaclav Smil, Energy and Civilization: A History, 2017, MIT Press. Chronology of Energy-Related Developments
15. MIT Energy Initiative conducts research and posts reports on a broad range of topics. See http://energy.mit.edu/studies-reports/.
16. Daniel Yergin, *The Quest*, The Penguin Press, 2011. Hardcopy, Kindle and Audible versions available.
17. Our World in Data https://ourworldindata.org/
18. Penn World Table https://www.rug.nl/ggdc/productivity/pwt/?lang=en
19. 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.
20. 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 version available.