



Energy, Economy & Environment

Course: Economics 511

Term and year: Winter 2024

Course pre-requisite(s): 3 credits each of Micro & Macro Economics

Course co-requisite(s): ECON 326 A- or better (not required but advised)

Course schedule: [REDACTED]

Classroom: [REDACTED]

Number of credits: 3

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Office hours: TBD

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5) *In the event of circumstances beyond the University's control, the content and/or evaluation scheme in this course is subject to change. As such portions of the course may be offered remotely, if conditions lead to this being necessitated.*

6) *No audio or video recording of any kind is permitted during seminars.*

7) *It is important that students take care of both mental and physical health during their studies. Please consult McGill's Student Wellness Hub website if you feel you need professional assistance or health care. Here will be found a wide-range of services offered for students, including dietitians, sexologists, nurses, doctors, wellness advisors, counsellors, and psychiatrists. I encourage all students to acquaint themselves with the website and the services on offer prior to the Winter semester.*

Course Overview

Interdisciplinary study of the short-term and long-term interactions between economic activity, energy usage and the environment. Implications of rising fossil fuels usage for environmental damage and its consequences for the future. The political economy of energy in national politics and international relations; the interface of energy and financial flows; the challenge of globally managing toxic residues.

This course is designed for senior undergraduate and graduate students from Economics, the Bieler School of Environment, Natural Resource Sciences, Agricultural Economics, Geography, Development Studies, and others disciplines involved in serious studies relating to energy, the economy, and the environment. The focus of the course is on the role of energy and matter, past, present, and future in shaping human "progress." It blends economic, technological, and ecological factors to understand flows and trends over time, with students engaging throughout the course with the notion that everything happens in a broad biophysical environment, one not susceptible to proper understanding by isolating it into such individual pieces.

The Environmental Kuznets Curve posits that as "prosperity" (a concept requiring careful definition) increases, environmental damage (another definitional challenge) will diminish - how this difference can actually be measured, relatively or absolutely, is a difficult matter. A leading question in the course is on the existence or not of an inevitable trade-off between: (a) further increases in the level of economic activity measured in monetary terms; and (b) escalating

environmental damage at the planetary level, something not susceptible to a monetized calculation. This requires students to be aware of definitional complications and estimation difficulties, cardinal and ordinal, quantitative and qualitative. It is important, too, to know who does the actual estimating, how and why, as well as to appreciate the shifting priorities of multiple stakeholders in the ever changing outcomes.

A distinction that guides us throughout the course is that between first generation Ecological Economics/Anthropocene literature and the second generation of this scholarship. We today largely understand, from a scientific perspective, the issues surrounding human impacts on the natural world through studies such as the Planetary Boundaries, the Great Acceleration, the Scientists' Warning to Humanity, and the Millennium Ecosystem Assessment. Yet still modern economies proceed with an economic system based on national income accounting, GDP, and a growth objective, all of which has had and continues to have an influence on these four studies. These metrics and institutions have also, however, brought great and undoubted material affluence and wealth to many nations and peoples, while leaving much of the world in poverty, and still guide modern economics, including banking and financial systems. So where do we go from here? Students in this course are given the privilege (and the burden) of being part of the solutions to these issues as we think about transforming, if necessary, human thoughts, institutions, economies, and societies in the face of these trade-offs.

Required Course Materials

All required course materials will be distributed to students through mycourses during the semester. These consist of peer-reviewed articles and/or book chapters made available to students registered in the class. There are no required readings per se, but as this is a research-based course students are expected to use the course and the allotted time to find readings and articles to complete their research paper and to actively participate in course activities during seminar. As per a three-credit course at McGill students can expect to spend approximately 135 hours on the course throughout the semester.

Prior to the first class I ask all students to look through the following webpage. This may help to give you an idea of what sorts of issues/ideas in relation to the core course themes you would like to work on in your research paper. In the first class each student will stand up and give a brief introduction to the rest of class. Besides your name, where you come from, the name of your first pet, etc. you will tell us what sort of research you are interested in conducting in the class. This weblink from the McGill library could help to put you in the right direction:

<https://libraryguides.mcgill.ca/redpathbookdisplay/slw>

Please scroll down to the bottom of this page and click on the “SciLit 2023 – Energy E-Resources” tab for a full list.

Instructional Methods

The course is structured in a seminar format and we will meet weekly to dissect and discuss particular topics based on recommended readings from students.

The first month of the term gravitates around my lectures and presentations and will set the groundwork for later course work and student and group presentations. Topics covered will include peer-review skills, presentation skills, an abstract writing exercise, and an overview of the five (5) focus categories that students will be working within on their research papers. There will also be a 90-minute guest lecture from a McGill data librarian as well as an additional lecture by the myself on issues associated with the core class themes: energy, economy, and environment.

The second and third months of the course are focused on a group discussion format. Each group of five students will be grouped together in terms of their concentrated focus categories with five groups of five students. Each group is tasked with presenting, as a group, on two (2) research papers, of their own choosing, for one (1) pre-assigned class. There will be five (5) classes that proceed in this format and the class will be divided into five (5) groups of five (5) students. We will move tables so that all the five (5) groups sit together and discuss the assigned research papers. I will be circulating through the groups as this is happening and will be assisting each individual group with any questions/ideas that come up during the first two (2) hours of seminar. The final hour of seminar will be a group discussion moderated by the assigned group of the day on their own assigned readings for the day. In order to moderate this session each student group is tasked with providing questions they will then put to the rest of the class to guide a discussion.

As this course is structured around a research paper I will be monitoring and responding to students' needs throughout the semester and this may include meeting outside of class hours, either in person on campus or via Zoom, to work individually with students and make sure their research paper is on track for completion. I will be diligent in this and expect students to be able to provide clear and marked progress updates when asked.

Expectations for Student Participation

Participation in this class means actively engaging in seminar with questions, presentations and feedback for your peers. There are two (2) presentations by each student in the course of the semester and all students are expected to be respectful while presentations are occurring. Presenting to a group of people can be an intimidating experience and we wish to make this as comfortable as possible for all students.

Our weekly seminar will often include a discussion period. Students in this portion of class are likewise expected to be thoughtful and respectful and to keep any criticism tactful. We do not shy away from critique, but we offer it with sincerity and not with maliciousness. While all students are expected to attend each week and to actively participate, this does not mean that everyone has to speak on every topic and actively take part in all discussions; people learn differently and some people feel more comfortable than others speaking in groups and we respect those who learn and participate in this fashion.

All seminars will be in person in the assigned classroom and attendance is mandatory for students on any day with student and group presentations and peer feedback. The only exceptions for an absence are those either approved by me prior to class or accompanied by a doctor's note. In their presentations students will present their research, both in their initial presentation and in their final

presentation. In the first presentation all other students will peer-review these presentations and present their feedback to me. I will then present these to individual students with the option of meeting privately to go through this feedback. All peer-review forms (found on mycourses) must be uploaded to mycourses the day of the presentations in word.doc files ONLY. Do not upload them in any other format, please and thank you.

The middle section of the course, as per the schedule below, is focused on group and student discussions. Each group will then have to present their thoughts on selected readings to the rest of the class and lead a discussion for the remainder of class which will include participation from all five (5) of the students assigned with leading the discussion that day. Each group of five (5) students are tasked with providing the whole class with two (2) readings for the day. All students are expected to read the two (2) papers prior to the class and to actively participate in the group discussion. Each group will have to meet with each other and discuss prior to their assigned class what two (2) readings they want the rest of the class to read and discuss. Of course, these two papers must be aligned with the group's focus category.

Focus Categories

Each student in the class must choose one of the following as their topic of general interest for their research paper. Each individual student will then be tasked with finding a more refined and interesting research question to write their research paper on. Each student must submit an original research proposal, of roughly 250 words, to the professor on the day of their first presentation and students are NOT permitted to write on the same subject. While the focus categories will necessitate that individual projects are roughly similar, each student *must* come up with an original research question and paper.

1. Macroeconomic Institutions and Economic Transitions. We want to investigate macroeconomic stability and institutions in terms of national incomes accounts, supply and use tables, and other associated national institutions. This study should result in a better understanding of the centrality of certain institutions and give insight into transitions associated with future economic trajectories (i.e. Degrowth etc.). Students should be prepared to look at the trajectory of economic turmoil in certain nations over the past several decades (Zimbabwe, Venezuela, Sri Lanka, for example) and try to understand how specific institutions were changed and modified and how this affected the larger economy.

2. Washington Consensus, Developing Economics, Macroeconomic Institutions, and GDP Growth. This category will be focused on primary research into government documents and the like which outline and describe how macroeconomic institutions are changed and modified to promote a growth economy. This category is closely aligned with the preceding in that what is of concern here are institutions in times of transitions. Modelling techniques may be used and summary tables produced which summarize results and which may provide an insight into transitions in the future.

3. GIS for Carbon Accounting and Sequestration. Students here will be tasked with using GIS methods and skills to learn more about carbon pricing, trading, sequestration

and associated issues. This focus category is only permitted for students with demonstrable skill and training in using GIS programs. This focus category can also include research into agricultural tools such as Normalized Difference Vegetation Index (NDVI) and can be used by students wishing to research into issues of food security and agrarian economics.

4. *System of Environmental-Economic Accounting and Extended Environmental Input-Output Analysis.* This focus category will be for students with an understanding of Input-Output tables and will include research into better understanding changes that are currently being made worldwide to incorporate environmental measures into these accounting frameworks.

5. *Circular Economy.* Here students will be tasked with generating original research on attempts made in particular locations to generate institutions and production facilities in line with core principles of a circular economy. Students must first demonstrate their understanding of the concept of the circular economy and then choose an example of where these tenets are currently being espoused.

6. *Combustion Capital, Stranded Assets, and Green Energy Revolutions.* This category is interested in quantitative studies generating original data for attempting to understand financial assets currently tied up in combustion capital and what could potentially be called stranded assets. This includes all sorts of machinery and tools that may become obsolete if policies are enacted to transition to cleaner energy systems. The crucial aspect of this topic is understanding business costs and potential financial impacts on a wider scale for an economy if these assets become stranded. That is, what impact, perhaps demonstrated through tools such as derived demand analysis, will such forced obsolescence have on a larger economic region.

7. *Financial Systems and a Non-Growth Economy: Monetary Theory of the Anthropocene.* This category is specifically for students with some background in finance, who are able to understand monetary theory and, more specifically, bond and option markets. A central question probed here is what ramifications there are for a growth economy, one intertwined with bond markets and the incentive of receiving a greater return in the future for money invested today, if a growth economy is replaced with another sort of economy. What other incentives and motivations could there be, if a monetary return cannot be made to bond buyers and share-holders in corporations.

Learning Outcomes

All students enrolled in this course should be serious about making a detailed study in the form of a research paper, one potentially suitable for publication in a peer-reviewed journal though this is by no means mandatory. The topic of this paper is chosen by the student but must fall within one of the above pre-assigned focus categories. I will work with each student individually to develop their topic into a proper research study.

For students who have taken ECON 326, this research paper will be similar to your Case Study but will not be subject to the same sorts of limitations your Case Study was subject to. For graduate students enrolled in the course, having previously taken ECON 326 or not, the emphasis will be on using this course on what could potentially be a chapter of your thesis or is in some way contributing to your thesis completion and submission. Prior to enrollment it is *highly recommended* that you discuss this with your supervisor to make sure they agree to your taking this course and that it accords with your thesis plan and time-line of submission and completion.

At the end of the course students will have direct experience of the distinction between first generation Ecological Economics/Anthropocene research and second generation Ecological Economics/Anthropocene research. More directly, students in this course will earn the privilege (and responsibility) of being part of the second generation of this research as it is to this that your research papers and our weekly seminars will be directed.

Grading Scheme

Within the first 21 days of class each student is required to meet with me for 10-15 minutes to discuss possible topics for their research paper. They will also explain to me why they are taking the course and what they hope to get out of it. This will help to get all students on the right track and will allow each student to tailor a topic to the requirements of the course and the student's particular program needs. By the end of the first month of classes, students must have chosen the topic of their research paper.

All late submissions for each assignment will be subjected to a loss of one (1) mark per day up to a maximum of five (5) days. After this period your mark will be zero. This course is out of 100 marks and your grade is the accumulation of marks across the assignments and with course participation.

Name of assignment or exam	Due date	% of final grade
1. Abstract writing exercise	Jan. 24	10
2. Preliminary outline of research paper and presentation to class (7 minutes, timed) (Powerpoint).	Feb. 7 and Feb. 14	10
3. Peer review feedback for each student, preliminary research outline presentation.	Feb. 7 and Feb. 14	10
4. Participation and contribution to group discussions, as well as a 2-page reflection submitted on mycourses by each student on the day of your group's research seminar.	Feb. 21 – March 27	20
5. Preliminary bibliography for research paper (1 ½ pages)	Feb. 28	10
6. Final presentation of research paper to peers (12 minutes, timed) (Powerpoint).	Apr. 3 and Apr. 12	15

Name of assignment or exam	Due date	% of final grade
7. Final research paper submission	Apr. 20	25

Course Schedule

Week	Date	Description	Course materials	Assignments due
1	Jan. 10	Course format explanation; Student introductions; In-class discussion.	Short readings accompanied by group discussion.	
2	Jan. 17	Full explanation of group-discussion format; In-class discussion; Abstract writing exercise.	Selected readings from mycourses	
3	Jan. 24	Guest lecturer – data librarian; Group discussion to decide on individual topics.	Selected readings from Mycourses	Assignment 1
4	Jan. 31	Babcock lecture on energy, economy, and environment.		
5	Feb. 7	Preliminary outlines of research papers, ½ students in class; Peer-review.		Assignment 2 Assignment 3
6	Feb. 14	Preliminary outlines of research papers, ½ students in class; Peer-review.		Assignment 2 Assignment 3
7	Feb. 21	Group 1 discussion class	Student submissions to mycourses	Assignment 4
8	Feb. 28	Group 2 discussion class	Student submissions to mycourses	Assignment 4 Assignment 5
9	March 13	Group 3 discussion class	Student submissions to mycourses	Assignment 4
10	March 20	Group 4 discussion class	Student submissions to mycourses	Assignment 4
11	March 27	Group 5 discussion class	Student submissions to mycourses	Assignment 4
13	April 3	Final student presentations of research paper, ½ students		Assignment 6
13	April 10	Final student presentations of research paper, ½ students; Course review and observations		Assignment 6

Background References

For those who want a good survey of environmental history at the start of the course, see Clive Ponting *A Green History of the World 2nd ed.* For the more modern period see J.R. McNeill *Something New Under the Sun: An Environmental History of the Twentieth-Century World.*

For those with little background in ecological economics, biophysical economics, or energetics see John Peet *Energy and the Ecological Economics of Sustainability* especially Part I. It is clearly written and technically accessible, though perhaps too elementary for some students in this course.

A treatment of ecological economics with considerable theoretical material contrasting the ecological with orthodox approaches is in Herman Daly & Joshua Farley *Ecological Economics: Principles and Applications.*

With respect particularly to energy and energetics, the best general overall view of the issues is in Vaclav Smil's *Energy in World History.* This can be partly replaced by his short and readable *Energy: A Beginners Guide* and *Oil: A Beginners Guide.* See as well Smil's *Energy in Nature and Society: General Energetics of Complex Systems* especially sections 1,2,7,8,9. With Smil if you do not like any of his books he has about 40 more to choose from, often too packed with data. But for relief his beautifully produced *Cycles of Life: Civilization and the Biosphere* is especially compelling.

Charles Hall and Kent Klitgaard *Energy and the Wealth of Nations: Understanding the Biophysical Economy.* Available at the McGill library as a e-book for free download. Nicholas Georgescu-Roegan *The Entropy Law and the Economic Process* Harvard, the pioneering work uniting economics to thermodynamics, sometimes brilliantly clear, sometimes nearly incomprehensible.

Karl Cook *Man, Energy, Society.* The first major work after Georgescu-Roegen to link energy to the economy in a historical context. Fred Cottrell *Energy & Society* (revised and updated 2009) - an accomplishment evident from the title. A comparison of Cottrell and Cook is well worth the tour. Howard Odum, *Environment, Power and Society for the Twenty First Century* is a celebrated but not successful attempt to create an energy theory of value to unify physical, biological, and economic phenomena. For a general critique of the project see Martinez-Alier *Ecological Economics.*