

Economics 154-326
ECOLOGICAL ECONOMICS
Winter 2021 Syllabus
Class Times: Wed. 1:05-3:55

Instructor: Professor R. T. Naylor
Teaching-Assistant: Michael Babcock
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Students are expected to read carefully and follow precisely instructions below:

- 1))** *Students need to understand the meaning and consequences of cheating, plagiarism, and other academic offenses under the Code of Student Conduct. Students can submit written work in English or French. If you have a disability that might affect your academic work – **confirmed by a professional** - Professor Naylor will find a reasonable accomodation to help meet your needs **while respecting the structure and timetable of the course.***
- 2)** *In the event of circumstances beyond the University's control, the content and/or evaluation schemes will be subject to change.*
- 3)** *All slides, video recordings, lecture notes, etc. remain the instructor's intellectual property. You may use these only for your own learning (and research, with proper referencing/citation). Your dissemination or sharing of these materials may violate the instructor's intellectual property rights and be cause for disciplinary action*
- 4)** *For pedagogical reasons student attendance may be monitored and active participation expected or required during fixed (synchronous) class time. As such, you may be asked to turn on your camera and audio. If you do not have the necessary resources (e.g., adequate Internet bandwidth or equipment), inform your instructor at the beginning of term so accommodation, if possible, can be made .*
- 5)** *If you are not comfortable attending a lecture or a course component in a class that is recorded, you may log off Zoom and later watch the video recording in MyCourses. In addition to the recording of your image and voice, your name (or preferred name) may be displayed on screen, and your instructor may call your name during the lecture. By remaining in classes that are being recorded, you accept that personal information of this kind may be disclosed to others, whether during the lecture or when viewing the recording.*
- 6)** *Students are encouraged, given our special Zoom set-up, created and implemented by your TA Michael Babcock, to actively participate in class as much as possible. Please see document "Zoom Instructions" on the Mycourses Syllabus section for more on our special Zoom protocol..*
- 7)** *While all lectures are conducted on line, we **hope** some students will be able to attend in a classroom context at the Mac Campus for a few one hour tutorial session where students can present their own views and ask questions too complex to deal with properly in a crowded ZOOM session.*

A: COURSE RATIONALE AND OBJECTIVES

Ecological (AKA **biophysical**) economics differs in intent, perspective, and analytical method from mainstream economics. **Environmental** economics, for example, focuses on micro level “optimization;” while the main job of **macro-economics** is understanding, maintaining, and if possible accelerating “growth” at the economy-wide level. By contrast **biophysical economics** studies economic activity in terms of not just “resources” or “markets” but also consequences for the biosphere as a whole. Its main concern is not production or distribution at the micro or macro level but with depletion and pollution on a global scale.

In other words the ecological perspective asks how much damage the ecosystems on which human economy and society both depend can tolerate before breakdown occurs. To that question there is no simple response. However this course offers some tools and a multi-disciplinary perspective to help find at least a partial answer. To do well in the course you must understand the forces, human and natural, acting on the globe, their trajectories over time and space, and their implications, or you will be simply repeating pop slogans

NOTE CAREFULLY

1) Course **prerequisites** **six** credits of university level economics, **both micro and macro - no exceptions**. *Those with less than a solid B in prerequisites are advised to avoid the course.* You can’t understand the limitations of conventional economics unless you know what they are.

2) There are no “textbooks.” **Core** material is available *in lectures plus material in Modules on MyCourses*. *Attendance (real or “virtual”) is essential*. The “slides” (updated year by year) on MyCourses are an essential outline of more technical and complex material.

But real learning requires activating your eyes, ears, hands, and brain: you need to see material on the screen, listen to it being explained, take careful notes, and think about what you heard and saw. Just gawking at a screen means you are just fooling yourself.

3) Other sources, expanded and explained further, will be accessible on the modules of **MyCourses**. Hasty, sloppy, or negligent reading of course material could cost you seriously in academic terms.

4) **Some basics of ecology are important**. Students can check any *introductory* ecology book or **follow** the 12 unit (10-12 minutes each) **crash course** that explains core concepts at: https://www.youtube.com/results?app=desktop&search_query=crash+course+ecology

B: OTHER READINGS

There are sort-of textbooks available for ecological economics. A good starting point is **Herman Daly & Joshua Farley** *Ecological Economics: Principles and Applications*. You will be expected at the start of the course to familiarize yourself with the first three chapters to learn limits of standard economics. Other important chapters are noted in the Modules on MyCourses. **This is available as an e-book in the library so you can request prints of core chapters.**

Other books worth perusing include:

a) Charles Hall & Kent Klitgaard *Energy and the Wealth of Nations*, download free at: <https://link-springer-com.proxy3.library.mcgill.ca/book/10.1007%2F978-1-4419-9398-4>.

The contents are explained by the title itself.

b) Juan Martinez-Alier *Ecological Economics: Energy, Environment and Society* looks at some precursors of the thinking embodied in the subject.

c) **Stanislav Shmelev** *Ecological Economics: Sustainability in Practice* probably the most accessible of the more technical recent works.

d) **Blair Fix** *Rethinking Economic Growth Theory From a Biophysical Perspective* requires a reasonable grounding in calculus and macro-economic theory.

e) **Nicholas Georgescu-Roegen** *The Entropy Law and the Economic Process* is the most important book in development of ecological economics; its math and physics can be complicated and its grammar and sentence structure sometimes hard to parse. You may find more comprehensible Georgescu-Roegen's articles in the last MyCourses module.

f) **Vaclav Smil**, perhaps the most learned person on the interface of energy, economy, and environment, has written many books for various audiences. Some are short and easy to read, for example *Energy* or *Oil*, both written as *Beginner's Guides*. Perhaps his most scientific is *Energy in Nature and Society* while *Cycles of Life: Civilisation and the Biosphere* is his most fascinating.

(C): MODULES:

Each "module" in MyCourses relates to a particular class although there are many loops and feedbacks. *You might say that the course, rather than following a linear path like most orthodox classes, is itself a complex self-organising system.* Each module contains several items selected to complement or supplement lectures, and to clarify or extend issues raised in classes.

(D): THREE Required Written Works And Marking Systems.

First: The Op-Ed **OR Book Review Option (25%)** to be submitted **October ????**
BOTH 350 word max formatted in WORD 12 point type NO PDF's!!!!

Op Ed: there are detailed instructions on purpose, audience, limitations, and **Learning Objectives** in the **FIRST module on MyCourses**. Subjects need to be authorized by Naylor or Babcock before or after class; or by a **brief** to-the-point e-mail. *Make sure you use proper orthography along with correct technical terminology.* Poor orthography in a short OpEd piece can confuse the reader; poor use of technical terminology can undermine the credibility of your argument.

Book Review: there are many guides on the Internet. Look, for example, at reviews in *The London Review of Books*, far better than *The New York Review*. More generally see <https://writingcenter.unc.edu/tips-and-tools/book-reviews/>. See also **Section F below** at the **end of the syllabus** for the list of **permitted books** that may magically grow over time. Others are possible with permission of Professor or TA. *In all your written work, make sure you use correct syntax along with proper technical terminology.*

Op-ed & Book Review marking criteria (5 marks max for each)

1. Clarity
2. Appropriateness (to class material)
3. Structure of Argument
4. Quality of Exposition
5. References and Data
6. Conclusion - accuracy and credibility.

Second: The In-Class Test likely late February (35%). Its **Learning Objectives** are to test understanding of **core concepts** necessary to comprehend course material and learn to make your own analysis. The test will require precise short answers or sometimes true or false choices.

Third: Case Study (40%). Submission date, late March or **very** early April. Submit in **WORD 12 point type NO PDF's**. The topic of your **Case Study** needs to be **QUITE** different in form, objectives, and research methods from your **OpEd** but perhaps not so much distant in perspective from your book review, if that was your choice. In **very** simple terms an **Op-Ed** is *usually* about an environmental incident or accident at a particular time and place. There are many possible choices. **By contrast** your **Case Study** is something you need to analyze in its temporal and spatial context. *Metaphorically speaking, the OpEd is a snap shot of something nasty; the Case Study is more like a slow motion 3D horror film.*

Each student will prepare a **max five-page analytical text PLUS no more than two pages for references, charts, or diagrams** to discuss a wider, deeper, longer environmental issue than your Op-Ed covered. A Case Study uses the frameworks taught in class: e.g. circular flows of matter and energy, cycles of life, how entropy manifests itself in the time and space etc.. and the impact of human engineered energy and material flows into **and** out of **the economy of nature**.

Your analysis should be economically driven with careful regard for environmental and social consequences, both long and short term, both proximal and distal from the centre point of impact of the problem under review. A specific subject could be a metallic ore, a type of plant, a particular species of insect facing new problems because of human exploitation, direct or indirect. And so forth. For example somebody with a sweet tooth for honey and a sense of humor might investigate the *long term* fate of our food security as bees die off while those responsible claim the possibility of wacky alternatives like using drones for pollination are conjured up. The world is wide open for similar choices: animal, vegetable, mineral and the resulting impact by human interventions as well as blow-back effects. And there is no lack of possibility to roll your eyes over the pseudo-solutions to large scale problems by individuals and corporations with a huge stake, both political and financial, in posturing that the *status quo ante* can be replicated.

In other words, consider scale and scalability of both the problem and its consequences. Pay attention to habitat (natural or synthetic) plus material stocks, energy flows, toxin production, waste accumulation, and upsets that affect not simply energy and material at a **given** stage of production but well beyond. **Remember that the overriding theme of the course is that in methods and appetites the human economy functions by turning nature into garbage.**

One warning: Last year a lot of students just wrote standard form essays. That is **NOT** what we want.

Case Study Marking Criteria Spring 2021 (10 marks max each)

1. Systematic analysis with multiple spatial and temporal perspectives
2. Correct use of core course concepts
3. Quality, clarity, and depth of exposition
4. References and data sources

E: Additional Information For Case Study Guide

What makes a Case Study different from the OpEd other than length and amount of research? An **Op Ed** is a short opinion piece about an issue at a **reasonably recent point in time**. It might be focused on things like a new coal mine recently opening on the top of a mountain but suddenly all the gunk starts washing down into a local lake → ruining the fishing, maybe poisoning wildlife, destroying crops in an already shaky agricultural area, and maybe slowly killing off aboriginals who still survive by living off nature. This is all wrapped into one or a set of related

incidents from the same mine in a local area and a short time context. It usually calls for a quick fix – which would probably just turn into a cosmetic job or, worse yet, impossible to reverse the damage.

In the Case Study you are supposed to show off what you have learned over the course and how you learned to use those concepts and techniques. For example: why is there such a human appetite for animal, vegetable, or mineral X – maybe copper with its millenia of feeding assorted human appetites. (*Check out Google pictures for the Bingham Canyon Copper Mine.*) Ask when, where, and why the subject became important, and what dangers are there, not just from its initial production, but also its term of use(s), its process of dissipation (matter) or degradation (energy) and their consequences. You could start by painting the broad picture – temporal and spatial, looking at the interactions of the subject – be it animal, vegetable, or rock possibly interacting within a larger ecosystem **over time**. Almost anywhere you look, you will find examples, plants, trees, crops, minerals, species of fish or fowls, etc. under human pressure and reduced often to be simply a tribute to humanity rather than nature itself. Find one that for some reason interests or, better still, horrifies you for whatever reason. Almost anything can be your topic provided it is part of nature suffering human direct or indirect demands, not just today but over centuries and millenia.

Let me elaborate on copper that we talk about briefly in class. Leaving aside all the plants and animals, land-based or oceanic, there are dozens, even hundreds of other minerals or rocks that could qualify. You would certainly require some knowledge of the geology, geography, mineralogy, and changing uses humans had for copper over centuries, even millenia, before converging on what we do with it now. Once the broad natural context is created, the human and environmental side brings us to how copper became integrated into the human economy for millenia. How did it affect lives of our ancestors and now ourselves. What kind of a mess did its mining, processing, manufacturing, selling, then dumping the debris create - it still does. From this dynamic spatial and temporal point of view you can go into, for example, analysis not just copper but everything it touches on its voyage from sitting in a vein of copper ore, to a series of technical adaptations by humans, to the spreading uses and the accompanying increase in pressure on the original supplies, to the every rising need for more fancy technology with its own burdens imposed on the ecosystems. ***That perspective can be used for almost everything in nature that humans past, present, or future, use for their own benefit.*** Apart from similar stories about inflictions received by deserts, oceans, lakes, forested lands, and mountain chains, **the thing they have in common is the shift over time and space from being part of nature into an involuntary participant in a modern industrial supply chain.**

SOME KEY CONCEPTS TO BE UNDERSTOOD AND USED PROPERLY!

It is useful to keep a file of unfamiliar concepts so you can find them quickly and correctly.

Some examples:

Bio-geo-chemical cycles

Carrying capacity

Bioaccumulation

Ecosystem services

Limiting factors

Environmental footprint

Energy carriers, conversions, efficiencies etc.
Closed-loop versus linear-throughput systems
Entropy
Dynamic systems thinking
Path dependent behavior
Multi-criteria evaluation versus single-metric approaches
Mass balance analysis and industrial metabolism
Toxic garbage vs. ecosystem waste
PLUS other concepts explained in the course materials or your ecology book.

F: Brief List of Potential Books for Review. Other options must be cleared with Professor Naylor at least two weeks before submission. Bring a copy when you see him; if not in Montreal send your idea (and its justification) to Professor Naylor or Michael Babcock by e mail!

Janine Benyus *Biominicry: Innovation Inspired by Nature*
 Vernon Carter & Tom Vale *Topsoil and Civilization*
 William Catton *Overshoot: the Ecological Basis of Revolutionary Change*
 Alfred Crosby *Ecological Imperialism: the Biological Expansion of Europe 900-1900*
 Herman Daly & John Cobb *For The Common Good*
 Arthur Ferrill *The Origins of War*
 Carmel Finley *All the Fish in the Sea*
 Richard Grove *Green Imperialism*
 Jacob Hamblin *Arming Mother Nature: The Birth of Catastrophic Environmentalism*
 Donald Hughes *Ecology in Ancient Civilizations*
 Tim Jackson *Prosperity Without Growth*
 Nancy Langston *Forest Dreams, Forest Nightmares*
 Susan Lanier-Graham *The Ecology of War*
 Timothy Lecain *Mass Destruction: men and giant mines wired America and scarred the planet*
 Mark Levinson *The Box How the Shipping Container Made the World Smaller....*
 J.R. McNeill *Something New Under the Sun: An Environmental History of the Twentieth-Century World*
 William McNeill *Plagues and Peoples*
 Andreas Malm *Fossil Capital: the Rise of Steam Power and the Roots of Global Warming*
 Paul Mantoux *The Industrial Revolution in the Eighteenth Century*
 Gerland Markowitz & David Rosner *Deceit and Denial: Deadly Politics of Industrial Pollution*
 Alan Moorehead *The Fatal Impact*

John Perlin *A Forest Journey: the Story of Wood and Civilization*

Steven Pyne *Vestal Fire: An Environmental History Told Through Fire* (magnificent, over-long!)

Oliver Rackham *History of the Countryside*

Callum Roberts *The Unnatural History of the Sea*

Edmund Russell *War and Nature*

Marshall Sahlins *Stone Age Economics*

Richard Tainter *The Collapse of Complex Societies*

Richard Tucker *Insatiable Appetite: the United States and the Ecological Degradation of the Tropical World*

Nicholas Wade *Before the Dawn*

Donavan Webster *Aftermath: the Remnants of War*

Alan Weisman *The World Without Us*

Donald Worster *Rivers of Empire: Water, Aridity, and the Growth of the American West*

or any other of Worster's books.

List still in Progress. Whichever you pick be prepared to question what you read, use your imaginations, and to find the books check with Michael David Miller at the library for anything not immediately available in existing Library holdings. All of the above books have something important to say about the themes of the course; but that does not mean they are always right.