

ERTH 4303: Resources of a Finite Earth Winter 2023 Course Outline

Lectures: Friday 8:35 am TB 446

Office Hours: email me to set up a Zoom meeting
from 9 am to 3 pm Wednesdays

Course objective:

To learn about mineral, water, and food resources, in the context of economic, social and environmental consequences of their extraction and use; and the differences between concepts of sustainability of resource utilization in the short term (e.g., market cycles, electoral cycles), longer term (decades to centuries) and ultimate sustainability of industrial society.

Instructor: James Mungall
jamesmungall@cunet.carleton.ca

TA: Nabil Shawwa
NabilShawwa@cmail.carleton.ca

Textbook and Supplementary readings: There is no textbook required.
Stephen E Kesler and Adam C Simon, 2015, Mineral Resources, Economics and the Environment. Cambridge University Press ISBN 1107074910. Available on Amazon.

Course notes: I will put my .pptx lectures onto the course website for you before the class. Come to class.

Wikipedia assignment: Your term work will consist of editing or writing a Wikipedia article. You must enroll on Wikipedia as a student editor for this course. Please bring a laptop to class.

[https://dashboard.wikiedu.org/courses/Carleton_University/ERTH_4303_Resources_of_the_Earth_\(Winter\)?enroll=onxzeycm](https://dashboard.wikiedu.org/courses/Carleton_University/ERTH_4303_Resources_of_the_Earth_(Winter)?enroll=onxzeycm)

Marking:

Weekly quizzes after class through Brightspace (each of 12 weekly quizzes will be closed at 11:59 PM the following Thursday - you have seven days)	36%
Indigenous Learning Bundle quiz due Feb 5	4%
Wikipedia assignment - due dates in the course schedule below	60%
There is no midterm and no final examination - there is no e-proctoring of quizzes	

Brief course outline, by week and lecture date:

Items written in underlined italics are assignments for Wikipedia. Their grades total 100, which will be recalculated to make up the 60% weight of your course mark given to the Wikipedia assignment. Pay attention to the due dates. Items listed as 'no grade assigned' must be completed but will not be marked. The next assignment on your to do list will not be marked until the training exercise has been completed.

1. Jan 13. Introduction to the course. Chapters 1 and 2.

Concepts of carrying capacity of Earth and sustainable use of resources.

Get started on Wikipedia - everyone has a Wikipedia account

Training – Wikipedia policies. Due Jan 20.

Training – Plagiarism. Due Jan 20.

Training – Sandboxes, talk pages, and watchlists. Due Jan 20.

Note: doing Training and getting an account are essential to get credit for all subsequent exercises. Marks will not be given until relevant Training is done.

2. Jan 20. Environmental geochemistry. Chapter 3.

Geochemical reservoirs, reactions, geochemical cycles, timescales, pollution and remediation.

Evaluate Wikipedia.

Class discussion: Thinking about sources and plagiarism

Training - Evaluating articles and sources

Training - How to edit: Wikicode vs Visual Editor.

Exercise: Evaluate an article due Jan 27. **5% mark**

3. Jan 27. Mineral exploration and production. Chapter 4.

Exploration methods, mining, beneficiation, smelting, refining, mining law in Canada.

Choose your topic/Find your sources

Class discussion: What's a content gap?

Training – Finding your article

Guides for writing articles in your topic area - Chemistry, Environmental Science

Exercise: Choose a topic **Due Feb 3**

4. Feb 3. Guest Lecture - TBA

Add to an article

Training - adding citations

Exercise - copyedit an article and add a citation due Feb 10. **5% mark.**

5. Feb 10. Mineral economics. Chapters 5 and 6.

Land tenure, resources and reserves, reporting requirements in Canada, elasticity in supply and demand, return on investment, present value, externalities, long term sustainability.

Indigenous Learning Bundle: Indigenous-Canada relations. There is a quiz on this due Feb 12, **4% mark**

Start drafting your contributions - Everyone has written a first draft in the sandbox

Training - drafting in the sandbox

Exercise - Write a first draft of your contribution, with sources identified, and keep it in your Sandbox **25% mark**, due Feb 17.

6. Feb 17. Energy mineral resources. Chapter 7.

Fossil fuels, peak oil, carbon footprint and other externalities, enhanced recovery, nuclear power, renewable energy.

Peer review

Class discussion: Thinking about Wikipedia

Exercise – peer review two articles. **5% mark** due Mar 3.

7. Reading week no class Feb 24

8. Mar 3. Iron, steel and ferroalloys. Chapter 8. History of iron production, manganese, nickel, chromium, silicon, cobalt, molybdenum, vanadium, tungsten, niobium; resources, markets, environmental impacts, and future supplies.

Respond to your peer review and begin moving your work to Wikipedia.

Training: Moving work out of the sandbox

Exercise – move your work from the sandbox to Wikipedia due Mar 10.

9. Mar 10. Aluminum, light elements and technological elements. Chapters 9 and 10.

Continue improving your article.

Training: contributing images and media files

Exercise: add links to your article **5% mark** due Mar 17 – it must be out of the sandbox by now.

10. Mar 17. Precious metals and gems. Chapter 11.

Gold, silver, platinum-group elements, diamonds, gems; resources, markets, environmental impacts, and future supplies.

Polish your work. **5% mark** due Mar 24. We must see substantial editing since last week.

11. Mar 24. Food. Chapter 12. Construction, chemical, and industrial minerals. Chapter 13.

History and current state of food production; potash, phosphate, nitrate supplies, arable land as a resource; environmental risk and food security.

Reflection on Wikipedia

Exercise - Reflective essay **10% mark** Due Mar 31.

12. Mar 31. Water. Uses of water, types and amounts of water resources, water resource management and conflict, effects of climate change, consequences of overuse and degradation of water resources.

All edits complete: remarking of entire project is worth 40% due Wednesday April 12.

13. April 7. Global mineral reserves, resources, and sustainability. Chapter 14.

Resource estimation; recycling, substitution, energy cost of declining grade; environmental impact; future prospects for industrial society.

Academic offences:

<https://carleton.ca/senate/wp-content/uploads/Academic-Integrity-Policy1.pdf>

I have vigorously pursued academic offenses in the past and intend to continue to when circumstances warrant it. The following passages have been excerpted from the calendar of Carleton University, and will be applied in this course to ensure that students get credit where credit is due.

Excerpt from the Academic Integrity Policy:

"Students are responsible for being aware of and demonstrating behaviour that is honest and ethical in their academic work. Such behaviour includes:

- Following the expectations articulated by instructors for referencing sources of information and for group work.
- Submitting original work, citing sources fully, and respecting the authorship of others.
- Asking for clarification of expectations as necessary. Students who are in any doubt as to whether an action on their part may be viewed as a violation of the standards of academic integrity should ask for clarification.
- Identifying situations that may reasonably lead to a violation of this policy.
- Preventing their work from being used by others, e.g. protecting access to computer files, etc.
- Adhering to the principles of academic integrity when conducting and reporting research."

"Examples of plagiarism include, but are not limited to:

- submitting a take-home examination, essay, laboratory report or other assignment written, in whole or in part, by someone else;
- using ideas or direct, verbatim quotations, paraphrased material, algorithms, formulae, scientific or mathematical concepts, or ideas without appropriate acknowledgement in any academic assignment;
- using another's data or research findings
- submitting a computer program developed in whole or in part by someone else, with or without modifications, as one's own'
- failing to acknowledge sources through the use of proper citations when using another's work and/or failing to use quotation marks"

This means: don't copy and don't cheat.

LEARNING OUTCOMES

By the end of the course, each successful student will acquire the knowledge in the lecture allowing them to understand and critically evaluate historical, contemporary, and projected:

- sources and material flows of the key mineral resources used in contemporary society.
- economic and environmental constraints on mineral resource utilization.
- global supplies of food from agriculture and from natural sources.

In the context of Earth Science Learning Outcomes, this course will contribute to the following:

4. Explain the origin, consumption and impacts of humans on natural resources (e.g., energy, mineral, water, atmosphere) – Outcome Mastered
6. Critically evaluate geoscience data and their uncertainty to produce a scientific report – Outcome Reinforced
8. Produce independent research – Outcome Mastered
9. Demonstrate initiative, problem solving skills, teamwork and appreciation of knowledge limitations – Outcome Mastered

STUDENT ACCOMMODATIONS

Requests for Academic Accommodation

You may need special arrangements to meet your academic obligations during the term. For an accommodation request, the processes are as follows:

Pregnancy obligation

Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, visit the Equity Services website: carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf

Religious obligation

Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, visit the Equity Services website: carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf

Academic Accommodations for Students with Disabilities

If you have a documented disability requiring academic accommodations in this course, please contact the Paul Menton Centre for Students with Disabilities (PMC) at 613-520-6608 or pmc@carleton.ca for a formal evaluation or contact your PMC coordinator to send your instructor your Letter of Accommodation at the beginning of the term. You must also contact

the PMC no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with your instructor as soon as possible to ensure accommodation arrangements are made.

carleton.ca/pmc

Survivors of Sexual Violence

As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and its survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit: carleton.ca/sexual-violence-support

Accommodation for Student Activities

Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. <https://carleton.ca/senate/wp-content/uploads/Accommodation-for-Student-Activities-1.pdf>

For more information on academic accommodation, please contact the departmental administrator or visit: students.carleton.ca/course-outline

Missed tests or late assignments:

The deadlines for the Wikipedia assignment are firm except for incapacitation that can be covered by submission of a Self-Declaration form. If you submit a [Self-Declaration form](#) you may be allowed extensions to the Wikipedia deadlines except in those cases where other students are depending on your timely feedback (e.g., peer review due March 3).

Quizzes may be reopened for you if you make a request. Note however that they can be taken online over a three-day period and you don't have to be present at the lecture to answer the quiz so you will have ample opportunity to get to them before they close.