

CHM197 Environmental Chemistry in a Sustainable World: Focus on Energy

Instructor and Course Delivery

Jon Abbatt

Dept of Chemistry, 80 St. George St., Rm 324

jonathan.abbatt@utoronto.ca, 946-7358

Class location: TBA

Class hours: Thursdays from 10 am to 12 noon

Office Hours: When the class starts we'll try to find a time when you are all free.

This course will be delivered in person. For the first two class periods, a hybrid model will be used if necessary where both in-person and online instruction can occur if any students are unable to attend in person. *I encourage everyone to attend in person if you can!* All other classes will be in-person only with no class video recordings. If you cannot attend the first two classes in person, please email the instructor for connection information.

Course Overview

What this course is about

Welcome to CHM197! An important role that chemicals play in our lives is through their connections to energy, i.e. its production, use and impacts. This is true for all fossil fuels but also for most other energy sources, including nuclear power, solar power, and renewable biofuels. Energy choices are of central importance to human society, with direct impacts on the environment. With rising populations and standards of living for some of the world's peoples, there are important choices to make: Do we value energy solutions that have severe short-term environmental impacts or more diffuse long-term impacts? Are we concerned whether the impacts are local, regional or global? Should we follow grassroots or high tech pathways, ones that are centralized, or ones distributed down to the local or even household level? Intelligent solutions require a strong scientific understanding of the different options and their environmental impacts. *In sum, we will examine the chemistry of energy choices and their environmental impacts, as the world charts its way to a more sustainable future.*

What this course is not about

Important aspects of the connections between chemistry and energy are the ethical, economic and socio-political factors that come into play. As a science course, CHM197 does not primarily focus on these aspects of the subject although we will discuss them briefly.

Anticipated learning outcomes from the course

- You will learn to demonstrate the connections between chemistry and energy
- You will learn to evaluate how societal energy choices affect the environment
- You will expand your ability to think quantitatively about these subjects
- You will critically evaluate scientific literature, learning to summarize concepts and ask questions
- You will critique media coverage of energy topics, evaluating connections between society and science
- You will develop your oral and written communication skills

Prerequisites

The Ontario minimum standards in high school science and math.

Are you in the correct course?

This is a seminar course with a focus on oral and written discussion, not a lecture-style course. If you are a science major with a strong science background, you may find some content not challenging (but interesting nevertheless!); the level is appropriate for students without a strong science background.

Content

- Energy Overview: world use, historical trends, types
- Chemistry and Energy: units, heat engines, power plants, storage
- Common Chemical Fuels:
 - i. Fossil fuels: types, formation, extraction, impacts on climate, acid rain, air pollution
 - ii. Chemical products from fossil fuels: refining, petrochemicals
 - iii. Nuclear power: fission, nuclear reactors, waste disposal, health impacts
- Energy, Chemistry and the Future:
 - iv. Solar Energy: solar cells, passive versus active
 - v. Wind energy: locations, impacts
 - vi. Biofuels: ethanol, biodiesel, food versus fuel, anaerobic digestion
 - vii. Hydrogen: sources, fuel cells and transportation
 - viii. Carbon sequestration and geoengineering: methods, potential impacts

Course Components and Grading

Grading Scheme

Media critique topic – 3%

Media critique video – 10%

Media critique written report – 30%

Reading assignment posts – 12%

Participation (both in class and via online comments on videos) – 20%

Final assessment – 25%

Media Critique Project – It is important to critically assess scientific information given to the public, especially because so much in the popular press is not correct. You will pick two or three articles in the media that address a specific issue in energy and the environment. Do not choose articles from the scientific literature (e.g. from journals like *Nature*, *Science*, *Scientific American*). The articles should each present the topic in a different manner, with different biases, foci, and/or accuracy. Although you need to summarize each article with its take-home messages, a more important aspect of the project is that you synthesize how these articles are portraying the science: What aspects are accurately covered? What is inaccurate? What parts of the subject were ignored? Are the articles doing a good job at educating the public?

You will work on this project throughout the semester:

- You will submit the **Topic** by 5 pm Wednesday, September 29, which consists of about 50 to 100 words describing the subject material you will be addressing, including the references for a few articles on the topic that you may critique. You will get full credit if your submission is complete and on time.
- By 5 pm Wednesday, October 20 you will upload a 5 to 6 minute **Video** on your topic. Other students will provide (anonymous) constructive feedback by October 31 at 5 pm that you may want to address for the final written report. Your video will be graded on its structure, clarity and effective use of graphics.
- By 5 pm Monday, November 22 you will submit a 1500-word **Written Report**. Please electronically attach the articles you are critiquing. Your written report will be graded on: i) depth (Did you do research on the topic?), ii) clarity and organization (Is there a clear introduction, conclusion/synthesis, structure?), iii) the choice of topic and material to critique (Did you choose interesting articles that provide contrasting views on the same subject?), iv) citations (Did you include at least 5 citations (in addition to the articles you are critiquing) indicating the research you conducted?), v) effective incorporation of feedback from the class.
- All information about how to submit these items will be on the Quercus course page.

Reading assignment posts – We will discuss a number of short articles from the scientific literature and popular press in class. For each reading assignment, you will post to a class discussion board at least one question or comment/insight (one sentence is plenty) that arose while you read the article. Please submit these posts by

midnight of the day preceding the discussion. To get full credit (12%) you must submit posts for 8 reading assignments, indicating in some way that you actually read the article! For every assignment fewer than 8 in number that you post, you will lose 1.5% credit.

Participation in class and via online comments – The participation component of the course will be assessed by both the number and quality of contributions. In particular, you are expected to participate in class discussions. I understand that you may have to miss one class because of non-medical illness (or equivalent) but if you miss more than one class, this will impact your ability to participate and the participation grade you will receive. For an on-going illness, please contact the instructor and get a medical note.

You are also required to provide (anonymous) constructive comments on ten (10) of the videos posted by your classmates by 5 pm Sunday October 31. For example, “I really liked this part of your talk because ... but I didn’t understand this part ... ” or “Have you thought of addressing the issue of xxx ...?”.

Final assessment – The in-class assessment will consist of definitions, true/false, short answers, and perhaps a couple of short quantitative questions. You are responsible for material presented in class, all student videos, and the reading assignments. The assessment is one hour long, in the classroom on Thursday, December 2, i.e. last class of the course. You may bring a calculator.

Important dates

Media critique topic	by September 29, 5 pm
Media critique video	by October 20, 5 pm
Comments on posted videos	by October 31, 5 pm
Media critique written report	by November 22, 5 pm
Final assessment	on December 2, 10 am (i.e. last class)
Reading posts	every week (except Weeks 1 and 12), by midnight before class

Course Policies

Late penalties

- Media critique topic – 1% off per day late, e.g. a topic submitted one day late is worth 2%.
- Media critique video and written report – 10% off per day late, e.g. a paper that would have been graded 85% if handed in on November 22 at 5 pm would receive 75% if handed in on November 23 at 3 pm.
- Reading assignment posts – no credit for late posts, i.e. the questions are required to frame the discussion for the class the following day.
- Participation – no credit for late online video comments, i.e. the other students need your feedback to work on their written reports.

Medical (or equivalent) emergencies

No penalties if appropriate documentation is provided for such emergencies.

Students with accommodations

Students with diverse learning styles and needs are welcome! The University of Toronto is committed to accessibility: if you require accommodations for a disability, or have any other accessibility concerns about the course, please contact Accessibility Services as soon as possible.

Note that many accommodation requests must be submitted at least one week in advance of the course element deadline. As described above and given the seminar nature of the course, there are specific course elements (i.e. posts on readings, videos, comments on videos, in-class participation) for which extensions are **not** always possible because those elements involve the full class and are required for the seminar to proceed.

Communication with the instructor

Email is the best way to contact me. I will do my very best to return your email within 24 hours, Monday to Friday. I may be a bit slower on the weekend!

Learning environment

The University of Toronto is committed to equity, human rights and respect for diversity. All members of the learning environment in this course should strive to create an atmosphere of mutual respect where all members of our community can express themselves, engage with each other, and respect one another's differences. U of T does not condone discrimination or harassment against any persons or communities.

Privacy issues

Students may create audio-recordings of the classes for their personal use. Recordings are intended to permit class content review to enhance understanding of the topics presented. Audio-recordings are not substitutes for attending class. Students should note that since audio recordings are to be permitted, their voice may be recorded by others during the class. Please speak to the instructor if this is a concern for you.

Students agree to the following terms when creating audio recordings of lectures:

- Recordings are not to be distributed without the permission of the instructor via the Internet, using social media such as Facebook, peer-to-peer file sharing such as One Drive or Dropbox, or other distribution channels.
- Recordings are not to be shared with other classmates unless they are to be used in collaborative assignments, or if the instructor permits for other reasons.

Non-compliance with these terms violates an instructor's intellectual property rights and the Canadian Copyright Act. Students violating this agreement will be subject to disciplinary actions under the Code of Student Conduct.

Submission methods

Use Quercus for all submissions. If it is not possible to submit the articles used for the media critique via Quercus, they should be submitted via hardcopy to LM324 by the written report deadline.

Technology Requirements

Specific guidance from the U of T Vice-Provost, Students regarding student technology requirements is available here: <https://www.viceprovoststudents.utoronto.ca/covid-19/tech-requirements-online-learning/>

Advice for students more broadly regarding online learning is available here: <https://onlinelearning.utoronto.ca/getting-ready-for-online/>

This course requires the use of computers, and of course sometimes things can go wrong when using them. You are responsible for ensuring that you maintain regular backup copies of your files, use antivirus software (if using your own computer), and schedule enough time when completing an assignment to allow for delays due to technical difficulties. Computer viruses, crashed hard drives, broken printers, lost or corrupted files, incompatible file formats, and similar mishaps are common issues when using technology, and are not acceptable grounds for a deadline extension.

Institutional Policies and Support

Academic Integrity

Academic integrity is essential to the pursuit of learning and scholarship in a university, and to ensuring that a degree from the University of Toronto is a strong signal of each student's individual academic achievement. As

a result, the University treats cases of cheating and plagiarism very seriously. The University of Toronto's Code of Behaviour on Academic Matters (<https://governingcouncil.utoronto.ca/secretariat/policies/code-behaviour-academic-matters-july-1-2019>) outlines the behaviours that constitute academic dishonesty and the processes for addressing academic offences. Potential offences include, but are not limited to:

In papers and assignments:

1. Using someone else's ideas or words without appropriate acknowledgement.
2. Submitting your own work in more than one course without the permission of the instructor.
3. Making up sources or facts.
4. Obtaining or providing unauthorized assistance on any assignment.

On tests and exams:

1. Using or possessing unauthorized aids.
2. Looking at someone else's answers during an exam or test.
3. Misrepresenting your identity.

In academic work:

1. Falsifying institutional documents or grades.
2. Falsifying or altering any documentation required by the University.

All suspected cases of academic dishonesty will be investigated following procedures outlined in the Code of Behaviour on Academic Matters. If you have questions or concerns about what constitutes appropriate academic behaviour or appropriate research and citation methods, you are expected to seek out additional information on academic integrity from your instructor or from other institutional resources (see <https://www.academicintegrity.utoronto.ca/>). Here is an additional website to look at: <http://www.writing.utoronto.ca/advice/using-sources/how-not-to-plagiarize>.

In sum, all your work must be your own. It is very easy to identify work that is plagiarized and the ramifications are serious.

Copyright

If a student wishes to copy or reproduce class presentations, course notes or other similar materials provided by instructors, he or she must obtain the instructor's written consent beforehand. Otherwise, all such reproduction is an infringement of copyright and is absolutely prohibited. More information regarding this is available here: <https://teaching.utoronto.ca/ed-tech/audio-video/copyright-considerations/>.

Accessibility Needs

Please see entry above for [Students with Accommodations](#)

Accommodations for Religious Observances

Following the University's policies, reasonable accommodations will be made for students who observe religious holy days that coincide with the due date/time of an assignment, tutorial, class or laboratory session. Students must inform the instructor **before** the session/assignment date to arrange accommodations.

Additional Services and Support

The following are some important links to help you with academic and/or technical service and support:

- General student services and resources at [Student Life](#)
- Full library service through [University of Toronto Libraries](#)
- Resources on conducting online research through [University Libraries Research](#)
- Resources on academic support from the [Academic Success Centre](#)
- Learner support at the [Writing Centre](#)

- Information for [Technical Support/Quercus Support](#)

Acknowledgement of Traditional Lands

We wish to acknowledge this land on which the University of Toronto operates. For thousands of years, it has been the traditional land of the Huron-Wendat, the Seneca and, most recently, the Mississaugas of the Credit River. Today, this meeting place is still the home to many Indigenous people from across Turtle Island and we are grateful to have the opportunity to work on this land.