Course Syllabus

The Science of Energy in the Environment

Fall 2018

Energy is one of the most fundamental organizing principles of Nature as well as being a key concept in technology. Every physical, chemical and biological process crucially involves the transformation of energy. Einstein taught us that even matter is a form of energy. Energy is important to our understanding of the origin and evolution of the universe, as well as being the basis of Earth’s ecosystems, of technology and of the global economy. This course will explore the science of energy, and the related concept entropy, in all its forms. The historical evolution of energy technology leading to the present confrontation between energy production and climate will be considered.

This is a non-Science, 200-level breadth course primarily aimed at Arts and Humanities students in either School of the Environment programs or in the Faculty of Arts and Science.

Class time and location:     Fridays, 1pm - 3pm, ES B149

Tutorials:        Fridays, 12pm, SS 2114 and Fridays, 3pm, SS 1080

At the end of this course, students should be able to:

- **Show understanding** of a wide range of scientific energy concepts.
- **explain** how changes in energy underlie all aspects of the natural world, as well as key energy technologies.
- **compare** different types of energy technologies and how they appear in different social contexts through history.
- **reflect** on the implications of emerging challenges in energy technology and the importance of sustainable energy to the future of humanity.

**Instructors:**  
Stephen Morris (Physics)  
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Office hours: TBA

**Guest Lecturers:**  
Ben Akrigg (Classics)
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**Adonis Yatchew** (Economics)

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**Teaching Assistant:** Ye Tao (Physical and Environmental Sciences)

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Office hours: TBA

**Course Assessment:**

- One 2 hour in-class mid-term test on Oct 19th, 25%
- 2 Short writing assignments 2 x 10%
  
  Due: TBA
- Tutorial attendance & participation 15%
- Final Examination 40%

Some further notes on course requirements:

- The midterm test will be held in class on Oct. 19th. The test will cover the material from the preceding six weeks of the course, including guest lectures, readings and class notes etc., and will require short answers.

- Final exams are scheduled by the Faculty of Arts and Science. The exam period for this semester runs from the 8th to the 21st of December. The exam timetable will be published in October. The final exam will include both short-answer sections similar to the midterm test and a short essay section.

- Attendance is required at all lecture and tutorial sessions. You will be expected to have completed assigned readings or other preparation: this will be announced each week in class and posted on Quercus.

- **Students who miss the midterm will receive a mark of zero for that test.** However, if the test was missed for reasons entirely beyond your control you should, **within one week of the missed midterm**, submit to the instructor a written request for special consideration explaining your reason for missing the test, and attaching appropriate documentation, such as a medical certificate or a College Registrar's note. If your reason for missing the test is acceptable, then your mark will be proportionally redistributed over the other marked parts of the course.

**Lecture schedule:** *(subject to change on the fly)*
7th Sept: Introduction: what is energy?

14 Sept: Energy in all its forms

21 Sept: guest lecturer Ben Akrigg: Energy in agrarian civilizations

28 Sept: guest lecturer Ben Akrigg: Triremes and catapults

5 Oct: Energy and heat engines

12 Oct: Energy and entropy

19 Oct: midterm test in class

26 Oct: Electrical energy

2 Nov: Renewable energy sources

6 Nov: Last day to drop F courses without academic penalty

9 Nov: No class: Fall study break

16 Nov: guest lecturer Adonis Yatchew: Energy economics in the modern world

23 Nov: Nuclear energy in war and peace

30 Nov: guest lecturer Adonis Yatchew: Security, sustainability and the future

**Recommended Reading:** V. Smil’s *Energy: A Beginner’s Guide* (Oneworld, Oxford 2006). We will not follow this book closely, but it provides useful background reading for this course.

Additional readings and links will be provided in class or via Quercus.

**Accessibility Needs:**
The University of Toronto is committed to accessibility. If you require accommodations for a disability, or have any accessibility concerns about the course, the classroom or course materials, please contact Accessibility Services as soon as possible.

e-mail: accessibility.services@utoronto.ca

or visit: [https://www.studentlife.utoronto.ca/as](https://www.studentlife.utoronto.ca/as)

**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
(www.governingcouncil.utoronto.ca/policies/behaveac.htm) 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, including (but not limited to) doctor’s notes.

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 http://www.artsci.utoronto.ca/osai/students (http://www.artsci.utoronto.ca/osai/students)

Course Summary:

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<th>Details</th>
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