

**ENG PHYS 3ES3**  
**Introduction to Energy Systems**  
 Fall 2018  
 Course Outline

**CALENDAR/COURSE DESCRIPTION**

A survey course on energy systems with emphasis on the analytic tools needed to evaluate them in terms of performance, resources and environmental sustainability, costs, and other relevant factors over their life cycles.

We will examine the science, technology and human factors that interact in energy systems. Energy technologies (including resources, production, consumption, conversion, storage and transportation) will be analyzed in a global context including their societal and environmental impacts. Issues related to long term sustainability and sustainable development will be evaluated for current and proposed energy systems. The environmental impact of energy technologies, with an emphasis on climate change, will be examined. Innovations in energy technologies and systems will also be discussed.

**PRE-REQUISITES AND ANTI-REQUISITES**

Prerequisite(s): Registration in level III or above of an Engineering program or permission of the Instructor.

Antirequisite(s): MECH ENG 4O04 and CHEM ENG 4A03

**INSTRUCTOR OFFICE HOURS AND CONTACT INFORMATION**

**Rafael Kleiman**

JHE A324

[kleiman@mcmaster.ca](mailto:kleiman@mcmaster.ca)

ext. 26290

**Office Hours:**

After each lecture and by appointment

**TEACHING ASSISTANT OFFICE HOURS AND CONTACT INFORMATION**

TA #	Name	Email	Office Hours
TA 1	Ramis Imran Arbi	<a href="mailto:arbir@mcmaster.ca">arbir@mcmaster.ca</a>	By email appointment
TA 2	Elizabeth MacConnachie	<a href="mailto:macconne@mcmaster.ca">macconne@mcmaster.ca</a>	By email appointment
TA 3	Sara Moetakef Imani	<a href="mailto:moetakes@mcmaster.ca">moetakes@mcmaster.ca</a>	By email appointment
TA 4	Morgan Richards	<a href="mailto:richama2@mcmaster.ca">richama2@mcmaster.ca</a>	By email appointment
TA 5	Yushan Zhang	<a href="mailto:zhang749@mcmaster.ca">zhang749@mcmaster.ca</a>	By email appointment

**COURSE WEBSITE/ALTERNATE METHODS OF COMMUNICATION**

<http://engphys.mcmaster.ca/undergrad-studies/ug-courses/eng-phys-3es3/>

<http://avenue.mcmaster.ca/>

## COURSE OBJECTIVES

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

- Analyze the relevant factors and their interplay in energy systems, including technological and human factors.
- Analyze the carbon footprint and sustainability of an energy technology
- Assimilate new information independently regarding energy systems

This course is sustainability-focused based on the AASHE ([www.aashe.org](http://www.aashe.org)) standards for sustainability.

This course is on the [Course List](#) for the [Interdisciplinary Minor in Sustainability](#).

## MATERIALS AND FEES

**Required Texts:** None.

*Other required or recommended resources used during the course will be posted on Avenue to Learn.*

**Recommended Reference book (electronic copy available from library):**

Title Sustainable Energy: Choosing Among Options  
 Authors Jefferson W. Tester, Elisabeth M. Drake, Michael J. Driscoll, Michael W. Golay, William A. Peters  
 Edition 2<sup>nd</sup>  
 Publisher MIT Press, 2012  
 ISBN 0262304635, 9780262304634  
 Length 1056 pages

**Calculator:** Only the McMaster Standard Calculator will be permitted in tests and examinations. This is available at the Campus Store.

**Other Materials:** None.

## COURSE OVERVIEW

Date/Week	Lecture Topics	Readings
September 5-6, 2018	Introduction	
September 10-13, 2018	Background material	With Assignment #1
September 17-20, 2018	Human factors	With Assignment #1
September 24-27, 2018	Conventional Energy Sources/Uses	With Assignment #2
October 1-4, 2018	Renewable Energy Sources	With Assignment #2
<b>October 8-12, 2018</b>	<b>Mid-term Recess</b>	For EI Talk
October 15-18, 2018	Energy Conversion	For EI Talk

October 22-25, 2018	Energy Storage and Transport	With Assignment #3
October 29 - November 1, 2018	Climate Change	With Assignment #3
November 5-8, 2018	Climate Change	With Assignment #4
November 12-15, 2018	Climate Change	With Assignment #4
November 19-22, 2018	Environmental Impact	For Written Report
November 26-29, 2018	Comparison of Energy Technologies	For Written Report
December 3-5, 2018	Conclusions	

At certain points in the course it may make good sense to modify the schedule outlined above. The instructor reserves the right to modify elements of the course and will notify students accordingly, both in class and on Avenue to Learn. Posted changes take precedence over this course outline.

#### ASSESSMENT

Date/Week	Topic	Resource for questions
Sunday, September 16, 2018	Student Input due	Rafael Kleiman
Sunday, September 23, 2018	Assignment 1 due	TA #4 Morgan
Sunday, October 07, 2018	Assignment 2 due	TA #3 Sara
Sunday, October 21, 2018	Energy Innovation Talk due	TA #2 Elizabeth
Sunday, November 04, 2018	Assignment 3 due	TA #1 Ramis
Sunday, November 18, 2018	Assignment 4 due	TA #5 Yushan
Sunday, December 02, 2018	Written Report due	Rafael Kleiman

Assignments 1-4 will be posted 2 weeks in advance. All submissions must be made via Avenue to Learn.

Component	Weight	Notes
Student Input, due September 16, 2018	5%	No extensions
Assignments, due dates listed above (4)	30%	No extensions
Energy Innovation Talk, due October 21, 2018	15%	-1%/day late
Written Report, due December 02, 2018	25%	-5%/day late
Final Exam, Dec. 7-20, set by Registrar	25%	Cumulative: covering lectures, readings and assignments
Total	100%	

Attendance at lectures and participation in classroom discussions is expected.

#### ACCREDITATION LEARNING OUTCOMES

The Learning Outcomes defined in this section are measured for Accreditation purposes only, and will not be directly taken into consideration in determining a student's actual grade in the course.

Outcomes	Indicators
1. Can demonstrate an ability to identify and quantify the full range of short-term, long-term, local and global impacts of their engineering projects on society,	9.1

<b>including: economic aspects; social, cultural, and human health aspects, and; ecosystem integrity aspects.</b>	
2. <b>Can demonstrate an ability to identify the interaction between engineering and society, and to address uncertainties in predictions in a structured and transparent manner.</b>	9.2
3. <b>Can demonstrate an ability to assess the options from a sustainability engineering perspective, which emphasizes environmental stewardship and long-term decision-making.</b>	9.3

For more information on Accreditation, please visit: <https://www.engineerscanada.ca>

#### ACADEMIC INTEGRITY

You are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity.

Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: “Grade of F assigned for academic dishonesty”), and/or suspension or expulsion from the university.

It is your responsibility to understand what constitutes academic dishonesty. For information on the various types of academic dishonesty please refer to the Academic Integrity Policy, located at <http://www.mcmaster.ca/academicintegrity>

The following illustrates only three forms of academic dishonesty:

1. Plagiarism, e.g. the submission of work that is not one’s own or for which other credit has been obtained.
2. Improper collaboration in group work.
3. Copying or using unauthorized aids in tests and examinations.

#### ACADEMIC ACCOMMODATIONS

Students who require academic accommodation must contact Student accessibility Services (SAS) to make arrangements with a Program Coordinator. Academic accommodations must be arranged for each term of study. Student Accessibility Services can be contact by phone at 905.525.9140 ext. 28652 or e-mail at [sas@mcmaster.ca](mailto:sas@mcmaster.ca). For further information, consult McMaster University’s Policy for [Academic Accommodation of Students with Disabilities](#).

Students requiring academic accommodation based on religious, indigenous or spiritual observances should follow the procedures set out in the Religious, Indigenous and Spiritual Observances (RISO) policy. Students requiring a RISO accommodation should submit their request to their Faculty Office normally within 10 working days of the beginning of term in which they anticipate a need for accommodation or to the Registrar’s Office prior to their examinations. Students should also contact their instructors as soon as possible to make alternative arrangements for classes, assignments, and tests. You can find all paperwork needed [here](#).

**NOTIFICATION OF STUDENT ABSENCE AND SUBMISSION OF REQUEST FOR RELIEF FOR MISSED ACADEMIC WORK**

1. The [McMaster Student Absence Form](#) is a self-reporting tool for Undergraduate Students to report absences DUE TO MINOR MEDICAL SITUATIONS that last up to 3 days and provides the ability to request accommodation for any missed academic work. Please note, this tool cannot be used during any final examination period.
2. You may submit a maximum of 1 Academic Work Missed request per term. It is YOUR responsibility to follow up with your Instructor immediately (NORMALLY WITHIN TWO WORKING DAYS) regarding the nature of the accommodation. Relief for missed academic work is not guaranteed.
3. If you are absent for reasons other than medical reasons, for more than 3 days, or exceed 1 request per term you MUST visit the Associate Dean's Office (JHE-H301 (Hatch Building)). You may be required to provide supporting documentation.
4. This form must be submitted during the period of absence or the following day, and is only valid for academic work missed during this period of absence.
5. It is the prerogative of the instructor of the course to determine the appropriate relief for missed term work in his/her course.
6. You should expect to have academic commitments Monday through Friday but not on Saturday, Sunday or statutory holidays.

**NOTICE REGARDING POSSIBLE COURSE MODIFICATION**

The instructor and university reserve the right to modify elements of the course during the term. The university may change the dates and deadlines for any or all courses in extreme circumstances (e.g., severe weather, labour disruptions, etc.). Changes will be communicated through regular McMaster communication channels, such as McMaster Daily News, A2L and/or McMaster email. It is the responsibility of the student to check their McMaster email and course websites weekly during the term and to note any changes.

**TURNITIN.COM STATEMENT**

In this course we will be using a web-based service (Turnitin.com) to reveal authenticity and ownership of student submitted work. Students will be expected to submit their work electronically via Avenue to Learn (A2L) plagiarism detection (a service supported by Turnitin.com) so it can be checked for academic dishonesty.

Students who do not wish to submit their work through A2L must still submit an electronic and/or hardcopy to the instructor. No penalty will be assigned to a student who does not submit work to A2L. All submitted work is subject to normal verification that standards of academic integrity have been upheld (e.g., on-line search, other software, etc.). To see the Turnitin.com Policy, please go to [www.mcmaster.ca/academicintegrity](http://www.mcmaster.ca/academicintegrity).

**ON-LINE STATEMENT FOR COURSES REQUIRING ONLINE ACCESS OR WORK**

In this course, we will be using Avenue to Learn. Students should be aware that, when they access the electronic components of this course, private information such as first and last names, user names for the McMaster e-mail accounts, and program affiliation may become apparent to all other students in the same course. The available information is dependent on the technology used. Continuation in this course will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure, please discuss this with the course instructor.