

## Geography 459: Energy & Sustainability - Course Outline S17

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*Instructor – Paul Parker, SEED/GEM*

*Classroom – weekly classes Th 2:30-5:20, EV3 1408*

*Office Hours: TA, EV1 rm 356,*

*Office Hours: Instructor, Thursday 5:30-6:00, Thursday 12:30-2:00 EV3 room 4259*

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### Course Description

The major global energy systems: coal, oil, gas, nuclear, wind, solar and other renewables are examined. The distribution of energy resources and changing consumption patterns are reviewed. International comparisons will be made and the environmental impacts of different energy systems studied. Global climate change, its connection to energy consumption and more sustainable future options are explored.

### Lecture and Assignment Schedule

Week	Lecture Topic	Assignment
1	Course Overview / Primary Energy	
2	Global GHG Emissions / Coal/ Building Envelop	
3	Residential Energy Systems	1. Emission / Climate Scenario - due in
4	Oil and Gas	
5	Electricity: growing demand, green, smart	
6	Conservation Options for Residential Energy Systems	2. Group project presentations - household energy
7	Costs and Community GHG Inventories	
8	Nuclear, Aviation	
9	Mid-term test	Mid-term test
10	Hydro, Solar	
11	Wind, Tidal, Remote Communities	
12	Net Zero Energy Communities	3. Net-zero energy project presentations

Course information and assignment descriptions are posted on LEARN.

### Learning objectives

To understand the major Canadian and global energy systems.

To understand the source, conversion and use of fossil fuel, nuclear and renewable energy sources.

To understand the carbon intensity of various energy systems.

To gain skills to measure energy performance and to evaluate options to improve energy efficiency and to reduce carbon intensity.

## **Readings**

**Required Texts:** B. Everett, G. Boyle, S. Peake, J. Ramage 2012 *Energy Systems and Sustainability*. Oxford: Oxford University Press.

Natural Resources Canada. *Keeping the Heat In*. Ottawa

<http://www.oeenrncan.gc.ca/residential/personal/heat/keeping-heat-in-toc.cfm>

No single text covers all the material. Students are encouraged to read widely, starting with the readings and web sites listed on the LEARN course site.

## **Evaluation**

Final grades for the course will be based on:

CO2 emission / climate scenario [Assignment 1](#) (10%); due Tuesday week 3, 2:30pm

Residential energy conservation [group assignment](#) (30%); due Tuesday week 6, 2:30pm

Mid-term test (30%) in class, Tuesday week 9, 2:30 pm

Community Energy Planning [energy assignment](#) (30%); due Tuesday week 12, 2:30pm

Note: Penalties of 10% per day apply for assignments submitted late.

## **Alternative 3rd assignment: Community Experiential Learning (30%)**

Instead of preparing a net-zero energy plan for the community, a few students can work with REEP Green Solutions and report on those activities.

*What is the REEP House?*

## **REEP House for Sustainable Living**

"Kitchener's REEP House for Sustainable Living is your hands-on showroom offering "one-stop-shopping" for green living ideas, from the newest sunlight balanced LED lighting for your kitchen to solar panels and permeable paving!

**Tour this Century brick home** and learn how we found heritage style wood-framed arch-top stained glass windows that are R-7, gorgeous 100 year old recycled flooring, and super insulation. See: <http://reepgreen.ca/homeenergy101/> Use our modeling software to determine the cost, payback and energy savings of green options for your home, and to hook up with suppliers, contractors, grants and financing! [http://www.reepwaterlooregion.ca/prog\\_house.php](http://www.reepwaterlooregion.ca/prog_house.php)

*How much time am I expected to contribute?* 40 hours (e.g. 4 hrs x 10 weeks) May-July

## **University Requirements**

**Academic Integrity:** To create and promote a culture of academic integrity, the behaviour of all members of the University of Waterloo is based on honesty, trust, fairness, respect and responsibility Check [www.uwaterloo.ca/academicintegrity/](http://www.uwaterloo.ca/academicintegrity/) for more information. Students who are unsure what constitutes an academic offence are requested to visit the on-line tutorial at:

<http://www.lib.uwaterloo.ca/ait/>

**Consequences of Academic Offences:** Within ENV, those committing academic offences (e.g. cheating, plagiarism) will be placed on disciplinary probation and will be subject to penalties which may include a grade of 0 on affected course elements, 0 on the course, suspension, and expulsion.

ENV students are strongly encouraged to review the material provided by the university's Academic Integrity office (see: <http://uwaterloo.ca/academicintegrity/Students/index.html>).

**Grievance:** A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70 - Student Petitions and Grievances, Section 4, [www.adm.uwaterloo.ca/infosec/Policies/policy70.htm](http://www.adm.uwaterloo.ca/infosec/Policies/policy70.htm).

**Discipline:** A student is expected to know what constitutes academic integrity, to avoid committing academic offenses, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offense, or who needs help in learning how to avoid offenses (e.g., plagiarism, cheating) or about "rules" for group work/collaboration should seek guidance from the course professor, academic advisor, or the Graduate Associate Dean. When misconduct has been found to have occurred, disciplinary penalties will be imposed under Policy 71 – Student Discipline. For information on categories of offenses and types of penalties, students should refer to Policy 71 - Student Discipline, [www.adm.uwaterloo.ca/infosec/Policies/policy71.htm](http://www.adm.uwaterloo.ca/infosec/Policies/policy71.htm). For typical penalties, check Guidelines for Assessment of Penalties, [www.adm.uwaterloo.ca/infosec/guidelines/penaltyguidelines.htm](http://www.adm.uwaterloo.ca/infosec/guidelines/penaltyguidelines.htm)

**Appeals:** A student may appeal the finding and/or penalty in a decision made under Policy 70 - Student Petitions and Grievances (other than regarding a petition) or Policy 71 - Student Discipline if a ground for an appeal can be established. Read Policy 72 - Student Appeals, <http://www.adm.uwaterloo.ca/infosec/Policies/policy72.html>

**Note for students with disabilities:** The Office for Persons with Disabilities (OPD), located in Needles Hall, Room 1132, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with the OPD at the beginning of each academic term. Once registered with OPD, please meet with the course instructor, in confidence, to discuss your needs.

**Religious Observances:** Please inform the instructor at the beginning of term if special accommodation needs to be made for religious observances that are not otherwise accounted for in the scheduling of classes and assignments.

**Turnitin.com:** Plagiarism detection software (Turnitin) will be used to screen assignments in this course. This is being done to verify that use of all material and sources in assignments is documented. In the first week of the term, details will be provided about the arrangements for the use of Turnitin in this course. Students who do not wish to submit their assignments via Turnitin must indicate this to the instructor by the third week of class. These students will submit their material electronically via email directly to the instructor for evaluation and grading.