

**Faculty of Science Course Syllabus**  
**Department of Environmental Science**  
ENVS/SUST 4004  
Pathways to Sustainable Energy  
Fall 2019

**Instructor(s):** Dane George [dane.george@dal.ca](mailto:dane.george@dal.ca) Office Location: LSC 808  
Wayne Groszko [wgroszko@dal.ca](mailto:wgroszko@dal.ca)

**Lectures:** 08:35 am-09:55 am Studley SIR JAMES DUNN 304

**Laboratories:** N/A

**Tutorials:** N/A

### **Course Description**

As an interdisciplinary course, students will learn about energy management and renewable energy from the technical, economic and political perspectives. The Nova Scotia context will be a main focus, but students will be encouraged to research energy systems and policies worldwide. Following a technical introduction to various types of renewable energy and energy efficiency applications, students will engage in a broader policy discussion and a detailed examination of program design, implementation, measurement and evaluation. Industry experts in renewable energy and energy efficiency will be invited as guest lecturers. This course will give students skills and knowledge that are sought after in the workforce.

### **Course Prerequisites**

ECON 1101.03 or ECON 1102.03 or SUST 2001.06 and be a 4th year student or permission of instructor

### **Course Objectives/Learning Outcomes**

This course is broken down into three modules: (1) The Big Energy Picture; (2) Renewable Energy; and (3) Energy Efficiency.

#### **Module 1: The Big Energy Picture**

Students will have gained an understanding of trends in energy demand and supply over until 2050. They will have a basic understanding of key concepts related to energy supply and demand to prepare the students for the following two modules that go more in depth into the technical aspects of various technologies. Students will also understand concepts like cap and trade, carbon tax, demand side management, feed-in-tariffs, quotas and auctioning mechanisms. They will be able to analyze and evaluate the benefit and limitations of different incentive models with respect to the existing energy system and to individual renewable energy and energy efficiency technologies.

#### **Module 2: Renewable Energy**

By the end of this module students will have a firm understanding of how the most common renewable energy technologies work and will understand the advantages and disadvantages of each technology. They will understand some of the barriers that have thus far prevented widespread adoption of these technologies and insights into new policies that can help overcome some of the obstacles to implementation.

**Module 3: Energy Efficiency and Demand Side Management**

Students will leave with a thorough understanding of energy efficiency applications in the residential and commercial sectors and a familiarity with key terminology used in the energy efficiency field. Common energy efficiency upgrades such as lighting, heating, ventilation and air conditioning, building envelope and heat recovery will be explored. Administrative models to deliver demand side management programs will be covered including spillover, free ridership, community-based social marketing, and other marketing strategies. Students will be able to evaluate and measure energy efficiency programs and create and design their own energy efficiency program to the accepted industry standard.

**Course Materials**

Readings and resources will be posted to the course website: <https://dal.brightspace.com>

**Course Policies***Late Submissions:*

The final mark for any late submission will be reduced by 10% for each day that it is late.

*Absence, Missed Assignments and Course Requirements:*

Students shall use the [Student Declaration of Absence form](#) for missed academic requirements. The form will be available on Brightspace. It is the responsibility of students who are absent from lectures to ascertain what was missed, including announcements of tests and other information.

**Course Assessment**

Component	Weight %	Comments
Quizzes	15%	<p><b>Quizzes</b> will be held throughout the semester. The quizzes may include long answer questions, multiple choice and simple numerical problems. Quizzes are valued at 5% each.</p> <p><b>Quiz 1: Thursday, September 19<sup>th</sup>, 2019</b>  <b>Quiz 2: Thursday, October 24<sup>th</sup>, 2019</b>  <b>Quiz 3: Thursday, November 21<sup>st</sup>, 2019</b></p>
Assignments	45%	<p>Weekly assignments will include writing summaries (book chapters, journal articles, news articles, long answer questions, and numerical problems).</p> <p><b>One submission due by Thursday evening each week, except the weeks of group presentations, reading week and the last week of classes (final project due).</b></p>
Research or technical project	25%	<p>Project details will be assigned to you in the second week of classes.</p> <p><b>Outline or project plan: Due October 4<sup>th</sup>, 2019 - 5/25 points</b>  <b>Mid-term Submission: Due November 1, 2019 – 5/25 points</b>  <b>Final Report: November 29<sup>th</sup>, 2019 (end of term) – 15/25 points</b></p>
Group presentation	15%	<p>Students will receive a group mark for the presentation format and content, and individual marks for delivery. Each student should speak equally during the presentation. Feel free to attempt an 'alternative' presentation format.</p> <p>Taking place <b>Thursday, October 10<sup>th</sup>, 2019</b>. Groups of 3-4 will be assigned during the second week of class.</p>

**Conversion of numerical grades to Final Letter Grades follows the Dalhousie Common Grade Scale**

A+ (90-100)	B+ (77-79)	C+ (65-69)	D (50-54)
A (85-89)	B (73-76)	C (60-64)	F (<50)
A- (80-84)	B- (70-72)	C- (55-59)	

**Course Content**

Below is a list of course topics and guest lecturers in chronological order. Please note that it may change slightly, since many industry experts will be giving guest lectures and we may need to make changes to accommodate their schedules.

<b>Topic</b>
The Big Energy Picture
Electricity, Energy and Demand, Energy Monitoring
Energy Calculations
Energy Economics and Incentives
Government Policy
Demand Side Management and Energy Efficiency
Community Engagement
Residential Energy Efficiency
Green Building Techniques, Standards and Concepts
PACE and Energy Efficiency Programming
Commercial Energy Management
Electric Vehicles
Energy Storage
Solar Energy – Heating and Photovoltaic (PV) Electricity
Wind Energy
Hydro Power
Ocean Energy
Biomass

## University Policies and Statements

**This course is governed by the academic rules and regulations set forth in the University Calendar and by Senate**

### **Academic Integrity**

At Dalhousie University, we are guided in all of our work by the values of academic integrity: honesty, trust, fairness, responsibility and respect (The Center for Academic Integrity, Duke University, 1999). As a student, you are required to demonstrate these values in all of the work you do. The University provides policies and procedures that every member of the university community is required to follow to ensure academic integrity.

**Information:** [https://www.dal.ca/dept/university\\_secretariat/academic-integrity.html](https://www.dal.ca/dept/university_secretariat/academic-integrity.html)

### **Accessibility**

The Advising and Access Services Centre is Dalhousie's centre of expertise for student accessibility and accommodation. The advising team works with students who request accommodation as a result of a disability, religious obligation, or any barrier related to any other characteristic protected under Human Rights legislation (Canada and Nova Scotia).

**Information:** [https://www.dal.ca/campus\\_life/academic-support/accessibility.html](https://www.dal.ca/campus_life/academic-support/accessibility.html)

### **Student Code of Conduct**

Everyone at Dalhousie is expected to treat others with dignity and respect. The Code of Student Conduct allows Dalhousie to take disciplinary action if students don't follow this community expectation. When appropriate, violations of the code can be resolved in a reasonable and informal manner—perhaps through a restorative justice process. If an informal resolution can't be reached, or would be inappropriate, procedures exist for formal dispute resolution.

**Code:** [https://www.dal.ca/dept/university\\_secretariat/policies/student-life/code-of-student-conduct.html](https://www.dal.ca/dept/university_secretariat/policies/student-life/code-of-student-conduct.html)

### **Diversity and Inclusion – Culture of Respect**

Every person at Dalhousie has a right to be respected and safe. We believe inclusiveness is fundamental to education. We stand for equality. Dalhousie is strengthened in our diversity. We are a respectful and inclusive community. We are committed to being a place where everyone feels welcome and supported, which is why our Strategic Direction prioritizes fostering a culture of diversity and inclusiveness

**Statement:** <http://www.dal.ca/cultureofrespect.html>

### **Recognition of Mi'kmaq Territory**

Dalhousie University would like to acknowledge that the University is on Traditional Mi'kmaq Territory. The Elders in Residence program provides students with access to First Nations elders for guidance, counsel and support. Visit or e-mail the Indigenous Student Centre (1321 Edward St) ([elders@dal.ca](mailto:elders@dal.ca)).

**Information:** [https://www.dal.ca/campus\\_life/communities/indigenous.html](https://www.dal.ca/campus_life/communities/indigenous.html)

### **Important Dates in the Academic Year (including add/drop dates)**

[https://www.dal.ca/academics/important\\_dates.html](https://www.dal.ca/academics/important_dates.html)

### **University Grading Practices**

[https://www.dal.ca/dept/university\\_secretariat/policies/academic/grading-practices-policy.html](https://www.dal.ca/dept/university_secretariat/policies/academic/grading-practices-policy.html)

### **Missed or Late Academic Requirements due to Student Absence (policy)**

[https://www.dal.ca/dept/university\\_secretariat/policies/academic/missed-or-late-academic-requirements-due-to-student-absence.html](https://www.dal.ca/dept/university_secretariat/policies/academic/missed-or-late-academic-requirements-due-to-student-absence.html)

## Student Resources and Support

### Advising

**General Advising** [https://www.dal.ca/campus\\_life/academic-support/advising.html](https://www.dal.ca/campus_life/academic-support/advising.html)

**Science Program Advisors:** <https://www.dal.ca/faculty/science/current-students/academic-advising.html>

**Indigenous Student Centre:** [https://www.dal.ca/campus\\_life/communities/indigenous.html](https://www.dal.ca/campus_life/communities/indigenous.html)

**Black Students Advising Centre:** [https://www.dal.ca/campus\\_life/communities/black-student-advising.html](https://www.dal.ca/campus_life/communities/black-student-advising.html)

**International Centre:** [https://www.dal.ca/campus\\_life/international-centre/current-students.html](https://www.dal.ca/campus_life/international-centre/current-students.html)

### Academic supports

**Library:** <https://libraries.dal.ca/>

**Writing Centre:** [https://www.dal.ca/campus\\_life/academic-support/writing-and-study-skills.html](https://www.dal.ca/campus_life/academic-support/writing-and-study-skills.html)

**Studying for Success:** [https://www.dal.ca/campus\\_life/academic-support/study-skills-and-tutoring.html](https://www.dal.ca/campus_life/academic-support/study-skills-and-tutoring.html)

**Copyright Office:** <https://libraries.dal.ca/services/copyright-office.html>

**Fair Dealing Guidelines** <https://libraries.dal.ca/services/copyright-office/fair-dealing.html>

### Other supports and services

**Student Health & Wellness Centre:** [https://www.dal.ca/campus\\_life/health-and-wellness/services-support/student-health-and-wellness.html](https://www.dal.ca/campus_life/health-and-wellness/services-support/student-health-and-wellness.html)

**Student Advocacy:** <https://dsu.ca/dsas>

**Ombudsperson:** [https://www.dal.ca/campus\\_life/safety-respect/student-rights-and-responsibilities/where-to-get-help/ombudsperson.html](https://www.dal.ca/campus_life/safety-respect/student-rights-and-responsibilities/where-to-get-help/ombudsperson.html)

### Safety

**Biosafety:** <https://www.dal.ca/dept/safety/programs-services/biosafety.html>

**Chemical Safety:** <https://www.dal.ca/dept/safety/programs-services/chemical-safety.html>

**Radiation Safety:** <https://www.dal.ca/dept/safety/programs-services/radiation-safety.html>

**Scent-Free Program:** <https://www.dal.ca/dept/safety/programs-services/occupational-safety/scent-free.html>