

# Pathways to Sustainable Energy Syllabus

## Department of Environmental Science

### ENVS / SUST Fall 2026

*Dalhousie University operates in the unceded territories of the Mi'kmaw, Wolastoqey, and Peskotomuhkati Peoples. These sovereign nations hold inherent rights as the original peoples of these lands, and we each carry collective obligations under the Peace and Friendship Treaties. Section 35 of the Constitution Act, 1982, recognizes and affirms Aboriginal and Treaty rights in Canada.*

*We recognize that African Nova Scotians are a distinct people whose histories, legacies, and contributions have enriched the part of Mi'kma'ki known as Nova Scotia for over 400 years.*

#### Course Instructor(s)

| Name              | Email             | Office Hours                                       |
|-------------------|-------------------|----------------------------------------------------|
| Dr. Wayne Groszko | wgroszko@dal.ca   | Fridays, 10 - 11 am,<br>Wallace McCain<br>Learning |
| Dr. Sue Molloy    | sue.molloy@dal.ca | By appointment                                     |
| TA - TBA          | TBA               | Tutorials                                          |

#### Course Description

In this interdisciplinary course, students will learn about energy efficiency and renewable energy from technical, economic, and political perspectives, with the goal of understanding and being able to contribute to the transition to zero-carbon energy systems. The Nova Scotia context will provide a focal point, and students will be encouraged to learn about energy systems and policies worldwide. Following a fundamental introduction to energy, the course will explore energy efficiency and renewable energy systems for buildings, electricity, and transportation. Students will gain technical skills in energy analysis, as well as engaging in a discussion of energy policies, program design, implementation, measurement, and evaluation. Industry experts in renewable energy and energy efficiency will be invited as guest lecturers.

### ***Course Prerequisites***

ECON 1101.03 or ECON 1102.03 or SUST 2001.06 and be a 4th year student or have permission from the instructor.

## **Student Resources**

The course has two co-instructors and a tutorial assistant. Reach the instructors or the TA by email or on Teams with your questions or to set up an appointment, or in person with the instructor after each lecture or with the TA during tutorial time. The tutorials are optional times (not mandatory) to ask questions or work on your Café Scientifique discussions or the course project.

## **Course Structure**

### ***Course Delivery***

Blended – Mainly in-person lectures and guest speakers plus some synchronous and asynchronous recorded sessions. Most of the learning activities require being in class in person, including presenting your work and leading discussions in Café Scientifique. Course documentation and resource files will all be hosted on Brightspace.

- To access online components requires a computer with speakers, microphone, camera, high-speed internet access and web browser and software for Dal Brightspace.
- Online platforms to be used are Dalhousie Brightspace and Collaborate Ultra.
- Quizzes will be online in Brightspace.
- Course instructors can be contacted by email and Teams chat. In person meetings on campus are also possible, mostly on Wednesdays and Fridays.
- All course times and due dates are in Atlantic Time.

If you are connecting to online resources from outside Canada, you are responsible for ensuring awareness and compliance with any applicable laws in the country where you are connecting.

### ***Lectures***

Time: Wednesdays and Fridays from 8:35 to 9:55 am from September 8 to December 9.

Location: LSC Common Area Room C338.

No class on Sept. 30, Nov. 11, Nov. 13

### ***Tutorials***

Tutorials are optional. There is no planned instructional content during tutorials, but you can ask the TA questions, prepare for Café Scientifique, and work together on the course project. The instructor may not be present in person but can be contacted.

T01 is Mondays from 11:35 am to 12:25 pm in Mona Campbell Building, Room 1107

T02 is on Mondays from 14:35 to 15:25 in Mona Campbell Building, Room 1107

No tutorial time on Oct. 12, Nov. 9.

Extra tutorial time available on December 8.

## **Course Materials**

Course materials, including presentations and readings, will be available online through Brightspace (<https://dal.brightspace.com>). There is no printed textbook for the course.

- To access online components requires a computer with speakers, microphone, camera, high-speed internet access and web browser and software for Dal Brightspace.
- Online platforms to be used are Dalhousie Brightspace and Collaborate Ultra.
- Course instructors can be contacted by email and Teams chat and after class.
- All course times and due dates are in Atlantic Time.

## **Learning Objectives**

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

Students will gain an understanding of key physical concepts related to energy and the basic elements and processes involved in energy systems. Students will also understand economic concepts related to energy, such as capital and operating expenses, cap and trade, carbon tax, demand side management, and feed-in-tariffs.

### **Module 2: Energy Efficiency and Demand Management**

Students will gain 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. Today's energy efficiency upgrades such as lighting, heat pumps, ventilation and air conditioning, building envelope and heat recovery will be explained, along with high performance building systems such as Passive House and Net Zero Energy buildings. Students will learn how home energy assessment and building energy modelling works. Recent technologies in energy efficient transportation and demand management, such as smart controllers and bidirectional electric vehicle chargers, will be discussed.

### **Module 3: Renewable Energy**

By the end of this module students will have a solid understanding of how the most deployable and upcoming renewable energy technologies work and will understand the advantages and disadvantages of each technology. They will understand the challenges involved in the transformation of energy systems and how those challenges can be addressed. Students will develop skills in renewable energy feasibility analysis.

## Assessment

| Component                                           | Weight % | Comments                                                                                                                                                                                                                                                                                                                                        |
|-----------------------------------------------------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Interview                                           | 5%       | <b>One</b> ten-minute interview with the instructor, individually or in small groups, to understand your previous knowledge and experience and interests in sustainable energy. This is also an opportunity to prepare for your briefing note and your project. If an interview is not possible in person or online, a survey can be completed. |
| Lead two <i>Café Scientifique</i> presentations     | 30%      | <b>Café Scientifique</b> is a participatory discussion on a technical topic. Peer-reviewed articles about sustainable energy will be assigned or chosen and you will lead the discussion with your colleagues about these articles and their implications.                                                                                      |
| Participate in <i>Café Scientifique</i> discussions | 10%      | <b>Ask great questions</b> in the <i>Café Scientifique</i> discussions in class. Participation will be evaluated based on questions asked and contributions made to understanding.                                                                                                                                                              |
| Briefing Note                                       | 15%      | <b>Prepare a briefing note</b> on a specific energy-related policy or project for a government official to use. Interview at least one expert about the topic to prepare your briefing note.                                                                                                                                                    |
| Research project                                    | 30%      | <b>Research project related to sustainable energy</b> – detailed instructions will be provided. Project can be individual or a group of up to 4 students. The report is due on the last day of class (December 9, 2026).                                                                                                                        |
| Presentation                                        | 10%      | <b>Oral presentation of your research work.</b> Students presenting in a group will receive a group mark for the presentation format and content, and individual marks for delivery. Each student should contribute equitably to the presentation. To be in class and tutorial times between Nov 18. and Dec. 9, 2026.                          |

Conversion of numerical grades to final letter grades follows the **undergraduate\***

[Dalhousie Grade Scale](#)

(\*for graduate courses, be sure to include the [graduate](#) grade scale)

|             |            |            |           |
|-------------|------------|------------|-----------|
| A+ (90-100) | B+ (77-79) | C+ (65-69) | D (50-54) |
| A (85-89)   | B (73-76)  | C (60-64)  | F (0-49)  |
| A- (80-84)  | B- (70-72) | C- (55-59) |           |

## **Course Policies on Missed or Late Academic Requirements**

### *Late Submissions:*

The final mark for a late submission that doesn't have an exception granted in advance 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. It is the responsibility of students who miss a topic to ascertain what was missed, including announcements of tests and other information.

## **Course Policies related to Academic Integrity & Artificial Intelligence**

This course is collaborative in its approach. Students are welcome to collaborate on research for assignments and projects, however for individual assignments the work you submit must be your own. Work is expected to be original and to include correct citations for information and quotes from other scholars. Plagiarism detection software will not be used in this course. If you use generative artificial intelligence or large language models (for example, ChatGPT, Claude, CoPilot) to generate draft text for assignments or reports, you are responsible for checking the accuracy and suitability of any generated text and editing the text accordingly, and for disclosing your use of artificial intelligence. We recommend writing your own drafts first because it helps develop your writing and thinking skills.

## **Course Accessibility**

Refer to the Student Accommodation Policy for information on how Dalhousie instructors and staff can help create and sustain an educational environment that is accessible for you.

You are eligible for accommodations based on defined needs and on protected characteristics such as religion. If you have religious, cultural, or community-significant observances that conflict with course requirements, reach out to me to collaboratively find alternatives for completing the course requirements.

To begin the process of requesting a formal academic accommodation, contact the Student Accessibility Centre.

## Course Content

| Topic                                            | Sub-Topics                                                          |
|--------------------------------------------------|---------------------------------------------------------------------|
| <b>The Big Energy Picture</b>                    |                                                                     |
| Introduction to Energy                           | Work, Energy, Power                                                 |
| Energy Systems                                   | Electricity, Heat, Motive Power                                     |
| Quantifying Energy                               | Energy and Power Calculations                                       |
| Energy Economics and Policies                    | Rates, Tariffs, Incentives                                          |
| <b>Energy Efficiency &amp; Demand Management</b> |                                                                     |
| Buildings                                        | Residential & Commercial Buildings, Energy Assessments & Upgrades   |
| Transportation                                   | Electric and hydrogen vehicles, bidirectional charging systems.     |
| Industrial Processes                             | Thermal and Electric Processes in Industry                          |
| Energy Efficiency Financing                      | Loans, Grants, Property Assessed Clean Energy Financing             |
| Energy Storage                                   | Batteries, Thermal Storage, Hydrogen, Pumped Hydro, Demand Response |
| <b>Renewable Energy</b>                          |                                                                     |
| Solar Energy                                     | Solar Electric, Solar Heating                                       |
| Wind Energy                                      | Onshore Wind, Offshore Wind                                         |
| Hydro Power                                      | Dams, Run-of-River, Hydro Storage                                   |
| Ocean Energy                                     | Tidal, Wave, Ocean Thermal Energy                                   |
| Biomass Energy                                   | Forest and Agricultural By-products, Algae as Energy Carriers       |

## Syllabus Appendix

*(Link to University Policies and Statements)*

[Syllabus Appendix: Student Supports & University Statements, Policies, and Guidelines](#)