

# Sustainable Energy

## Program Requirements

### M.A. Sustainable Energy (5.0 credits)

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<b>1. 0.5 credit in:</b>	0.5
SERG 5000 [0.5]	Cross Disciplinary Course in Sustainable Energy
<b>2. 0.5 credit in:</b>	0.5
SERG 5002 [0.5]	Sustainable Energy Engineering for Policy Students
<b>3. 0.0 credit in:</b>	0.0
SERG 5800 [0.0]	Sustainable Energy Seminar
<b>4. 0.5 credit in:</b>	0.5
PADM 5510 [0.5]	Energy Economics
<b>5. 0.5 credit in:</b>	0.5
PADM 5121 [0.5]	Policy Analysis: The Practical Art of Change
<b>6. 0.5 credit in:</b>	0.5
PADM 5515 [0.5]	Sustainable Energy Policy
or PADM 5615 [0.5]	Politics and Policy of Energy in Canada
<b>7. 1.5 credit selected from the Sustainable Energy Policy program field listed below</b>	1.5
<b>8. 1.0 credit from graduate level courses offered by the School of Public Policy and Administration</b>	1.0
<b>Total Credits</b>	<b>5.0</b>

#### Notes:

1. Courses must be appropriate to the student's qualifications and selected with the approval of the student's program supervisor.
2. Only a selection of courses listed is given in a particular academic year.

#### Courses - Sustainable Energy Policy Field

PADM 5511 [0.5]	Energy Management
PADM 5512 [0.5]	International Politics of Sustainable Energy
PADM 5572 [0.5]	Policy Seminar (Sustainable Energy)
PADM 5611 [0.5]	Science and Technology Policies
PADM 5612 [0.5]	Industrial Policy, Innovation and Sustainable Production
PADM 5613 [0.5]	Science, Risk and Evaluation
PADM 5614 [0.5]	Natural Resource Management
PADM 5616 [0.5]	Environmental Policy
PADM 5617 [0.5]	Implementing Sustainable Development in Industrialized Countries
PADM 5618 [0.5]	Environmental and Ecological Economics
PADM 5619 [0.5]	Urban Sustainability
PADM 5620 [0.5]	The Science, Politics and Economics of Global Climate Change
PADM 5908 [1.0]	Research Essay
PADM 5909 [2.0]	M.A. Thesis

SERG 5906 [0.5]	Directed Studies in Sustainable Energy
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Other courses as approved by the MA supervisor

### Co-op Option for M.A. in Sustainable Energy Policy

A co-op option is available to full-time students in the M.A. program. Students admitted to this option must satisfactorily complete at least two work terms in order to graduate with a co-op designation on their transcripts and diplomas. These work terms are four months in duration and locate students in government departments or other organizations in order to work at a junior officer level. They provide students with opportunities to integrate the theoretical and practical aspects of public administration. During a work term, students will register in PADM 5319. While on a work term, students are limited to an additional 0.5 credit course. It should be noted that most co-op positions in the federal public service are restricted to Canadian citizens.

### M.A.Sc. Sustainable Energy (5.0 credits)

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<b>1. 0.5 credit in:</b>	0.5
SERG 5000 [0.5]	Cross Disciplinary Course in Sustainable Energy
<b>1. 0.5 credit in:</b>	0.5
SERG 5001 [0.5]	Sustainable Energy Policy for Engineers
<b>3. 0.0 credit in:</b>	0.0
SERG 5800 [0.0]	Sustainable Energy Seminar
<b>4. 1.0 credit in</b> courses from the Mechanical Energy Conversion or Efficient Electrical Energy Systems fields listed below	1.0
<b>5. 1.0 credit from</b> graduate-level courses offered in the Faculty of Engineering and Design	1.0
<b>6. 2.0 credits in</b> M.A.Sc. thesis:	2.0
MECH 5909/ SYSC 5909/ ELEC 5909 [2.5]	M.A.Sc. Thesis
<b>Total Credits</b>	<b>5.0</b>

### M.Eng. Sustainable Engineering (5.0 credits)

#### Requirements:

<b>1. 0.5 credit in:</b>	0.5
SERG 5000 [0.5]	Cross Disciplinary Course in Sustainable Energy
<b>2. 0.5 credit in:</b>	0.5
SERG 5001 [0.5]	Sustainable Energy Policy for Engineers
<b>3. 0.0 credit in:</b>	0.0
SERG 5800 [0.0]	Sustainable Energy Seminar
<b>4. 1.0 credit in</b> courses from the Mechanical Energy Conversion or Efficient Electrical Energy Systems fields listed below	1.0

**5. 3.0 credits from** graduate-level courses offered in the Faculty of Engineering and Design. Up to 1.0 of these 3.0 credits may be replaced with courses from the Sustainable Energy Policy program fields listed above (excluding PADM 5618, PADM 5906, PADM 5908, PADM 5909). 0.5 of these 3.0 credits may be replaced with Energy Economics (PADM 5510).

3.0

Total Credits 5.0

**Courses - Mechanical Energy Conversion Field**

MECH 5009 [0.5]	Environmental Fluid Mechanics Relating to Energy Utilization
MECH 5201 [0.5]	Methods of Energy Conversion
MECH 5203 [0.5]	Nuclear Engineering
MECH 5205 [0.5]	Building Performance Simulation
MECH 5400 [0.5]	Gas Turbine Combustion
MECH 5402 [0.5]	Gas Turbines
MECH 5403 [0.5]	Advanced Thermodynamics
MECH 5407 [0.5]	Conductive and Radiative Heat Transfer
MECH 5408 [0.5]	Convective Heat and Mass Transfer
MECH 5809 [0.5]	Special Topics in Mechanical and Aerospace Engineering
ENVE 5101 [0.5]	Air Pollution Control
ENVE 5102 [0.5]	Traffic-Related Air Pollution
ENVE 5103 [0.5]	Air Quality Modeling
ENVE 5104 [0.5]	Indoor Environmental Quality
SERG 5906 [0.5]	Directed Studies in Sustainable Energy

**Courses - Efficient Electrical Energy Systems Field**

ELEC 5200 [0.5]	Advanced Topics in Integrated Circuits and Devices
ELEC 5509 [0.5]	Integrated Circuit Technology
ELEC 5705 [0.5]	Advanced Topics in VLSI
ELEC 5707 [0.5]	Microsensors and MEMS
ELEC 5808 [0.5]	Signal Processing Electronics
ELEC 5900 [0.5]	Engineering Project I
SYSC 5001 [0.5]	Simulation and Modeling
SYSC 5004 [0.5]	Optimization for Engineering Applications
SYSC 5006 [0.5]	Design of Real-Time and Distributed Systems
SYSC 5103 [0.5]	Software Agents
SYSC 5104 [0.5]	Methodologies For Discrete-Event Modeling And Simulation
SYSC 5105 [0.5]	Software Quality Engineering and Management
SYSC 5201 [0.5]	Computer Communication
SYSC 5207 [0.5]	Distributed Systems Engineering
SYSC 5306 [0.5]	Mobile Computing Systems
SYSC 5401 [0.5]	Adaptive and Learning Systems
SYSC 5600 [0.5]	Adaptive Signal Processing
SERG 5906 [0.5]	Directed Studies in Sustainable Energy
TIMG 5001 [0.5]	Principles of Technology Innovation Management
TIMG 5002 [0.5]	Technology Entrepreneurship

TIMG 5103 [0.5]	Advanced Topics in Technology Innovation Management
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**Regulations**

See the General Regulations section of this Calendar.

**Academic Standing**

A grade of B- or better must be obtained in each course counted towards the master's degree.

**Full-time Continuation**

Students will be required to withdraw from the program if their weighted grade point average falls below 7.0 (B-) after two terms of full-time study (or equivalent), or if they receive a grade of less than B- in any two courses they have registered in.

**Part-time Continuation**

Students will be required to withdraw from the program if their weighted grade point average falls below 7.0 (B-) after completing 2.0 credits, or if they receive a grade of less than B- in any two courses they have registered in.

**Regulations**

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**Academic Standing**

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**Part-time Continuation**

Students will be required to withdraw from the program if their weighted grade point average falls below 7.0 (B-) after completing 2.0 credits, or if they receive a grade of less than B- in any two courses they have registered in.

**Admission**

Applicants must have a bachelor's degree (or equivalent), with an average of B+ or higher. The level of academic

performance and potential demonstrated within the degree is more important than the discipline; students may enter the program from a wide variety of academic backgrounds in the social sciences, humanities, sciences and engineering. Mid-career applicants who do not have a bachelor's degree, but who have demonstrated professional excellence over a number of years of work in the public sector will also be considered.

All applicants must have completed 1.0 credit in university-level micro- and macroeconomic theory (ECON 1000 [1.0] or the equivalent)

0.5 credit in PSCI at the 2000-level or higher, dealing with institutions and processes by which governments legitimize and exercise power, ideally in a Canadian setting (PSCI 2003 or equivalent).

A working knowledge of algebra is also expected.

In some cases, applicants may be admitted to the program despite not having completed one of these prerequisite courses in economics or political science, on the condition that the course be completed with a grade of B- or higher in the first year of the program. It is strongly recommended that students complete the prerequisites before starting the program, to ensure that their progress through the core courses is unimpeded.

Students whose first language is not English or who have not completed a previous degree at an English speaking university must demonstrate an adequate command of English by attaining, at least, a TOEFL score of 237 CBT (computer-based test) or 580 (written); or 86 IBT overall with a minimum score in each component of: writing: 22; speaking: 22; reading: 20; and listening: 20, or a CAEL score of 70, or an IELTS score of 7.0.

### **Admission**

Applicants must have a bachelor's degree (or equivalent) in a discipline relevant to engineering disciplinary foundations.

Normally, an average of B+ or higher is required for admission.

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## **Sustainable Energy (SERG) Courses**

### **SERG 5000 [0.5 credit]**

#### **Cross Disciplinary Course in Sustainable Energy**

This course integrates concepts and frameworks drawn from engineering and policy studies appropriate to sustainable energy, using case studies to introduce the challenges of interdisciplinary work in sustainable energy. Prerequisite(s): SERG 5001 or SERG 5002.

### **SERG 5001 [0.5 credit]**

#### **Sustainable Energy Policy for Engineers**

This course introduces engineering students to the policy world by examining political and policy institutions, and covering basic principles of policy analysis, as they relate to the energy realm.

### **SERG 5002 [0.5 credit]**

#### **Sustainable Energy Engineering for Policy Students**

This course introduces policy students to fundamental principles of engineering, particularly as they relate to energy production, transformation and consumption.

### **SERG 5800 [0.0 credit]**

#### **Sustainable Energy Seminar**

This course takes the form of a series of seminars presented by graduate students and other researchers in the area of sustainable energy. To complete this course, a student must attend at least ten seminars and make one presentation.

### **SERG 5906 [0.5 credit]**

#### **Directed Studies in Sustainable Energy**

A directed course on selected subjects related to sustainable energy as approved by a course supervisor.

**Summer session:** some of the courses listed in this Calendar are offered during the summer. Hours and scheduling for summer session courses will differ significantly from those reported in the fall/winter Calendar. To determine the scheduling and hours for summer session classes, consult the class schedule at [central.carleton.ca](http://central.carleton.ca)

Not all courses listed are offered in a given year. For an up-to-date statement of course offerings for the current session and to determine the term of offering, consult the class schedule at [central.carleton.ca](http://central.carleton.ca)