

# Sustainable Energy

- **M.A. Sustainable Energy**
- **M.A.Sc. Sustainable Energy**
- **M.Eng. Sustainable Energy**

## M.A. Sustainable Energy

### About the Program

The Master's program in Sustainable Energy involves advanced learning across engineering and public policy. Students will specialize in either the engineering or the policy side of the program, graduating with either an engineering degree (M.A.Sc. or M.Eng. in Sustainable Energy) or a public-policy degree (M.A. in Sustainable Energy). While specializing in either side of the program, students will also take courses that engage with the other disciplinary component. Students across the program will learn together, garnering an understanding of sustainable-energy problems in a setting of interdisciplinary collaboration.

### Academic Regulations

See the General Regulations (<http://www.carleton.ca/calendars/2012-13/grad/gradregulations>) 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.

### Admission Requirements

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 [0.0] 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.

### Program 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 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 5116 [0.5]  | Policy Analysis and Contemporary Governance        |
| <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            |
| 7. 1.5 credit selected from the Sustainable Energy Policy program field listed below                       | 1.5  |
| <b>8. 1.0 credit from</b> graduate level courses offered by the School of Public Policy and Administration | 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                           |
| 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

#### About the Program

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#### Academic Regulations

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#### Academic Standing

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

### Full-time Continuation

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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 Requirements

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.

### Program Requirements

|  |   |
|--|---|
| <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 [2.0]  |   |
| <b>Total Credits</b>   | <b>5.0</b>                                      |

### M. Eng. Sustainable Energy

#### About the Program

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#### Academic Regulations

See the General Regulations (<http://www.carleton.ca/calendars/2012-13/grad/gradregulations>) 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.

## Admission Requirements

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.

## Program 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        |
| <b>5. 3.0 credits from</b> graduate-level courses offered in the Faculty of Engineering and Design                               | 3.0        |
| <b>Total Credits</b>   | <b>5.0</b> |

## 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 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 Air 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                                  |
| TTMG 5001 [0.5] | Management Principles for Engineers                         |
| TTMG 5002 [0.5] | Telecommunications Technology                               |
| TTMG 5103 [0.5] | Advanced Topics in Telecommunications Technology Management |
| SERG 5906 [0.5] | Directed Studies in Sustainable Energy                      |

### 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)