

# Sustainable and Renewable Energy (SREE)

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## Sustainable & Renewable Energy (SREE) Courses

### Department of Mechanical and Aerospace Engineering

### Faculty of Engineering and Design

#### **SREE 1000 [0.0 credit]**

##### **Introduction to Sustainable Energy**

The concept of energy sustainability. Energy-economy system. Global energy trends, the next 100 years. Energy reserves and resources. Primary and secondary clean energy. Energy use, efficiency and renewables. Energy and the environment/climate change. Sustainable energy choices and policies.

Prerequisite(s): registration in Sustainable and Renewable Energy Engineering.

Lectures one hour per week.

#### **SREE 3001 [0.5 credit]**

##### **Sustainable and Renewable Energy Sources**

Primary energy sources and the pathways to use. Renewables: photovoltaic, solar-thermal, hydropower, geothermal, tidal. Fossil fuels and nuclear. Terrestrial, thermodynamic and electrical limitations.

Prerequisite(s): ENVE 2001 and MAAE 2300 and (ELEC 3605 or ELEC 2501 or fourth-year status in Environmental Engineering).

Lectures three hours per week, laboratories/problem analysis one hour per week.

#### **SREE 3002 [0.5 credit]**

##### **Energy Distribution and Efficient Utilization**

Electricity, hydrocarbons and hydrogen. Renewables, biofuels and biogas technologies. Distribution, smart grids, and storage systems. Systems integrating centralized and distributed energy conversion systems. Utilization for mobility, light, heating/cooling, industrial-thermal/mechanical, electrolysis.

Prerequisite(s): SREE 3001 and (ELEC 2501 or ELEC 3605).

Lectures three hours per week, laboratories/problem analysis one hour per week.

#### **SREE 3003 [0.5 credit]**

##### **Sustainable Energy Systems Design**

Residential, commercial and institutional use of energy, efficiency of end use systems. Solar power; technology, generation and economics. Passive solar heating/cooling. Fuel cell thermodynamics, kinetics and solid oxide fuel cells. Wind, ocean, geothermal, biofuels and biogas.

Integrated systems combining thermal and mechanical needs. Life-cycle analysis of alternatives.

Prerequisite(s): SREE 3001 and (ELEC 2501 or ELEC 3605).

Lectures three hours per week, laboratories/problem analysis three hours per week.

#### **SREE 4001 [0.5 credit]**

##### **Efficient Energy Conversion**

Steam generators, solid, liquid, gaseous and biofuels and cycles. Geothermal, solar powerplants. Energy storage.

Environmental aspects of power generation. Industrial use and auto-generation of energy. Energy intensity and efficiency of industrial processes and products.

Comparative analysis of raw material, energy, or product transport. Life-cycle analysis of alternatives.

Prerequisite(s): SREE 3002 and SREE 3003.

Lectures three hours per week, laboratories/problem analysis three hours per week.

#### **SREE 4002 [0.5 credit]**

##### **The Energy Economy, Reliability and Risk**

Interrelationship between energy and economic policy and regulations. Reliability of energy supply systems. Risk analysis and its application to the generation, distribution and environmental impacts of energy. Risks analysis and management associated with natural and human and regulatory influences. Environmental and public health risk analysis.

Prerequisite(s): fourth-year status in Engineering.

Lectures three hours per week.

#### **SREE 4907 [1.0 credit]**

##### **Energy Engineering Project**

Student teams develop professional-level experience by applying, honing, integrating and extending previously acquired knowledge in a major design project. Lectures are devoted to discussing project-related issues and student presentations. A project proposal, interim report, oral presentations, and a comprehensive final report are required.

Prerequisite(s): fourth-year status in Sustainable and Renewable Energy Engineering and ECOR 4995 (may be taken concurrently). Certain projects may have additional prerequisites or corequisites.

Lecture one hour a week, laboratory seven hours a week.

**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)