Instructor Information and Office hours:

Professor: Sucha S. Mann  Office: ME 4230
E-mail: SuchaMann@cunet.carleton.ca
Office Hours: to be announced

Course Number and Calendar Description:

SREE 4002A  Winter 2019  January 07 to April 9, 2019
Hours per week: 3 lecture hours per week

Prerequisites: Fourth-year status in Engineering

Course Description and Objectives: The course is an overview of topics that affect decisions about energy supply and technology options, placing sustainable and renewable energy sources and technologies within the larger context of policy choices that must be made at the societal and political levels. The goal is to provide the technical data and analytical tools that will enable engineers to help shape practical energy policies.

Major topics in the course include (i) an inventory of the supply, demand, and technologies for all energy forms, including fossil fuels, nuclear and renewable forms, (ii) economic and analytic tools and supporting decisions-making about energy options, and (iii) analysis of existing options and policies.

The technology, cost, global recommendation info (like, Inter-governmental Panel on Climate Change - IPCC) and regulatory information changes rapidly in this field, thus mostly online resources are used, and students are exposed to what's happening in real time by discussing major relevant news stories in each class.

One or two guest speakers will be invited to the class, so the students have exposure to the real individuals working on energy policies.

Project: Project is an integral part of the course in a team of 2-3 students per project team. The project in the course consists of an energy policy analysis for a specific jurisdiction (country province/state, or city). The report must include (i) an analysis of the technical facts and relevant data (current and projected supply and demand by energy type, factors affecting ability to procure supplies, etc.), (ii) an examination of existing policies covering aspects such as risk and environmental and economic impact, and (iii) recommended future policies, with supporting
Students will make 3 progressive Power Point presentations on their project over the course of the term, and also submit a final written report.

**Evaluation and Grading Scheme** - (Marking Scheme)

midterm: 15%
project: 35%
final exam: 50%

**Learning Outcomes:**

1. Enable engineers to “access technical data and use analytical tools” to help shape or recommend practical energy policies which are economical, and reliable. The recommended solution needs to minimize risk to the economy, environment, as well as be socially and politically acceptable.

2. **Problem Analysis** of current energy issues, alternate energy-technology options, economic, reliability, and risks associated with policy recommendation.

3. Energy Project Team solution presentation will inspire students to utilize their engineering knowledge to investigate current energy issues, use team work and communication skills.

**Graduate Attributes (GA’s):**

“The Canadian Engineering Accreditation Board” requires graduates of engineering programs to possess 12 attributes”.

Activities listed in all 3 Learning Outcomes are intended to develop students’ competence in the following attributes:

- **GA 1** (knowledge base for energy engineering and calculation)
- **GA 2** (Problem Analysis of current energy policies)
- **GA 4** (Design - energy recommendation to meet health and safety risks, economic, environmental, cultural and societal considerations)
- **GA 7** (Communication skills: An ability to communicate) will be used in the Project Development and Presentation (especially in the Learning Output 3).
- **GA 8** (Professionalism: An understanding of the roles and responsibilities of the professional engineer in society, especially the primary role of protection of the public and the public interest), and
- **GA 9** (Impact of engineering on society and the environment) are used in all three Learning Outcomes.

Data obtained from exam questions and the Project work will be collected to assess students progress towards achieving GA 1, 2, 4, 7, 8, and 9.

**Textbooks (or other resources) if applicable**
Textbook and Sources: There is no required textbook for the course. We will make use of a variety of information sources, many freely available online. Some of the more important documents include:

- World Energy Issues Monitor 2017 | Exposing the new energy realities
- World Energy Trilemma Index 2017: Monitoring the Sustainability of National Energy Systems
- World Energy Trilemma 2017: Changing Dynamics — Using Distributed Energy Resources
- Oct 08, 2018 -Summary for Policymakers of IPCC Special Report on Global Warming of 1.5°C approved by governments
  http://www.ipcc.ch/news_and_events/pr_181008_P48_spm.shtml
- IPCC Special Report on Global Warming of 1.5 °C (SR15)
  http://www.ipcc.ch/index.htm
- IPCC Climate Change 2014: Mitigation of Climate Change.
- IEA latest publications, like Energy Efficiency Indicators 2018: Highlights; Key World Energy Statistics 2018
  https://www.iea.org/statistics/?country=WORLD&year=2016&category=Key%20indicators&indicator=TPESbySource&mode=chart&categoryBrowse=false&dataTable=BALANCES&showDataTable=false

Other useful readings:

Breakdown of course requirements (labs, assignments, quizzes, exams, etc.): The final examination is for evaluation purposes only and will not be returned to students. Students will be able to make arrangements with the instructor or with the department office to see your marked final examination after the final grades have been made available.
Week-by-Week breakdown

### Approximate Schedule 2019

<table>
<thead>
<tr>
<th>Week of:</th>
<th>Topics:</th>
<th>Project/midterm:</th>
</tr>
</thead>
<tbody>
<tr>
<td>07-Jan</td>
<td>Introduction to the course.</td>
<td>form groups</td>
</tr>
<tr>
<td>14-Jan</td>
<td>The climate change problem. Fossil fuels: supply and demand</td>
<td>proposal due</td>
</tr>
<tr>
<td>28-Jan</td>
<td>Solar (all forms): supply and demand</td>
<td>project intro</td>
</tr>
<tr>
<td>04-Feb</td>
<td>Economics and analytic tools</td>
<td></td>
</tr>
<tr>
<td>11-Feb</td>
<td>Risk analysis</td>
<td>outline pres.</td>
</tr>
<tr>
<td>18-Feb</td>
<td><strong>BREAK WEEK: no classes</strong></td>
<td></td>
</tr>
<tr>
<td>25-Feb</td>
<td>Security, reliability, health, environmental risks and impacts.</td>
<td>midterm</td>
</tr>
<tr>
<td>04-Mar</td>
<td>Nuclear energy impacts.</td>
<td></td>
</tr>
<tr>
<td>11-Mar</td>
<td>Comparison of energy forms. Conservation as a policy.</td>
<td>progress pres.</td>
</tr>
<tr>
<td>01-Apr</td>
<td>Final presentations</td>
<td>final presentations</td>
</tr>
<tr>
<td>08-Apr</td>
<td>Conclusions - on Tuesday, April 9.</td>
<td>final reports due</td>
</tr>
</tbody>
</table>

### General Regulations

**Attendance:** Students are expected to attend all lectures and lab periods. The University requires students to have a conflict-free timetable. For more information, see the current Undergraduate Calendar, Academic Regulations of the University, Section 1.2, Course Selection and Registration and Section 1.5, Deregistration.

**Health and Safety:** Every student should have a copy of our Health and Safety Manual. A PDF copy of this manual is available online: [http://sce.carleton.ca/courses/health-and-safety.pdf](http://sce.carleton.ca/courses/health-and-safety.pdf)

**Deferred Term Work:** Students who claim illness, injury or other extraordinary circumstances beyond their control as a reason for missed term work are held responsible for immediately
informing the instructor concerned and for making alternate arrangements with the instructor and in all cases this must occur no later than three (3.0) working days after the term work was due. The alternate arrangement must be made before the last day of classes in the term as published in the academic schedule. For more information, see the current Undergraduate Calendar, Academic Regulations of the University, Section 2.6, Deferred Term Work.

**Appeal of Grades**: The processes for dealing with questions or concerns regarding grades assigned during the term and final grades is described in the Undergraduate Calendar, Academic Regulations of the University, Section 2.7, Informal Appeal of Grade and Section 2.8, Formal Appeal of Grade.

**Academic Integrity**: Students should be aware of their obligations with regards to academic integrity. Please review the information about academic integrity at: [https://carleton.ca/registrar/academic-integrity/](https://carleton.ca/registrar/academic-integrity/). This site also contains a link to the complete Academic Integrity Policy that was approved by the University's Senate.

**Plagiarism**: Plagiarism (copying and handing in for credit someone else's work) is a serious instructional offense that will not be tolerated.

**Academic Accommodation**: You may need special arrangements to meet your academic obligations during the term. You can visit the Equity Services website to view the policies and to obtain more detailed information on academic accommodation at [http://www.carleton.ca/equity/](http://www.carleton.ca/equity/)

- **Pregnancy obligation**: write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details see [https://carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf](https://carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf)

- **Religious obligation**: write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details see [https://carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf](https://carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf)

- **Academic Accommodations for Students with Disabilities**: The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at 613-520-6608 or [pmc@carleton.ca](mailto:pmc@carleton.ca) for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send me your Letter of Accommodation at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with me to ensure accommodation arrangements are made. Please consult [https://carleton.ca PMC/students/dates-and-deadlines/](https://carleton.ca PMC/students/dates-and-deadlines/) for the deadline to request accommodations for the formally-scheduled exam (if applicable).
- **Survivors of Sexual Violence**: As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and where survivors are supported through academic accommodations as per Carleton’s Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit: [https://carleton.ca/sexual-violence-support/](https://carleton.ca/sexual-violence-support/).

- **Accommodation for Student Activities**: Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, see [https://carleton.ca/senate/wp-content/uploads/Accommodation-for-Student-Activities-1.pdf](https://carleton.ca/senate/wp-content/uploads/Accommodation-for-Student-Activities-1.pdf)

**Copyright on Course Materials**: The materials created for this course (including the course outline and any slides, posted notes, labs, project, assignments, quizzes, exams and solutions) are intended for personal use and may not be reproduced or redistributed or posted on any web site without prior written permission from the author(s).