Renewable Energy, Technology, and Resource Economics

ENGR 3000 (3 credits / 45 class hours)

SIT Study Abroad Program:
Iceland: Renewable Energy, Technology, and Resource Economics

PLEASE NOTE: This syllabus represents a recent semester. Because courses develop and change over time to take advantage of unique learning opportunities, actual course content varies from semester to semester. Please do not assume these are the exact lectures and readings for any subsequent semester.

Course Description
This seminar takes an interdisciplinary approach to renewable energy to build a holistic understanding and develop competence in critical analysis of sustainability systems. Renewable energy technologies are presented in the context of their social, economic, and environmental impacts. Through interactive, experiential learning, access to experts in the field, and student-led activities, each student gains thorough knowledge in areas of interest to him or her as well as invaluable real world academic training. The seminar aims to engage students intellectually in relevant renewable energy issues and give ample opportunity to exercise their knowledge with program faculty in Iceland.

Learning Outcomes
By the end of this seminar, students will be able:

- To demonstrate understanding of the mechanics of a variety of renewable energy technologies;
- To differentiate among types and scales of energy utilization technologies;
- To relate energy production and consumption to resource use and management;
- To analyze and compare different energy systems and account for costs and benefits of different renewable energies;
- To design their own conceptual sustainable energy system.

Language of Instruction
This course is taught in English, but students will be exposed to vocabulary related to course content as well as the nuances of renewable energy, technology, and resource economics through in-country expert lecturers and field visits to a wide range of venues and regional locales.

Course Material and Texts
A course pack including selections from the texts listed below will be provided on the class website. You are not required to purchase these textbooks; several copies are in the program library for you upon arrival as well as large sections are available for perusal on Google books. Other course resources include the class website, which will be updated with relevant articles through the program, the SIT online resources library, and the Icelandic national subscription to academic sources online.

Pre-Departure Required Readings
All pre-departure readings and assignments can be found on the program’s Virtual Library at http://sit.libguides.com/ice.

Course Schedule

Each part of this course contains multiple sessions, exercises and/or assignments.

Module I - Introduction to Renewable Energy Systems in Iceland
In the first week of the program, students are introduced both to Iceland and to key academic concepts. It provides a background to renewable energy practice in Iceland as well as to Iceland’s history, culture, and society. From day one, the program visits places of significance where students experience renewable energy and sustainable communities firsthand. Site visits include Hellisheiði geothermal power plant, Carbon Recycling International (an innovative renewable methanol research and development firm), Svartsengi geothermal power plant, and the Blue Lagoon.

Recommended Readings:

Module II – Renewable Energy Technology
The program base is Ísafjörður, the capital of the Westfjords region. Students are hosted by local families, and classes are held at the University Centre of the Westfjords. A variety of educational methods are utilized to stimulate all learning styles, including interactive lectures, discussion, audiovisual material, hands-on building and creating, debate, presentations, and exploring the surroundings on field excursions. Major topics covered include:

- Energy concepts;
- Sustainability systems concepts;
- Hydropower;
- Geothermal power;
- Other renewables including solar, wind, and tidal power;
- Sustainable transportation including hydrogen fuel cells, electric vehicles, and methane;
- Management of energy resources;
- Life cycle analysis;
- Energy economics;
- Sustainability design and policymaking.

Each topic is related to the wider context, so students gain thorough comprehension of renewable energy in terms of sustainability.
The third portion of the program will be held in vibrant city of Reykjavik. As the country’s capital and largest city, Reykjavik is the center of much energy policy making and energy research. Students will spend most of the day having classes in resource economics, policies, and sustainable concepts as well as on environmental impacts of energy projects. Furthermore students will meet with experts in the field of renewable energy and leaders of industry, research, and development. Adequate time is dedicated to discussions about technological development, environmental concerns, and societal needs. Students will also learn about Iceland’s progress in exploring alternative fuels and the country’s potential for wind energy. Classes are held at the University of Reykjavik by experienced and highly qualified (guest) lecturers.

Recommended Readings:

Module IV - Highlands
Travel is an incredible source of learning from experience while studying abroad, and we see as much of Iceland as possible on the program. The end of the program trip to the highlands—accessible only in summer—will include highlights such as the spectacular geothermal area Landmannalaugar, extensive lava fields, glaciers, waterfalls, and many more of Iceland’s natural wonders. This excursion brings
students to the heart of Iceland's natural forces and will help students understand the unique geology behind the renewable energy.

**Evaluation and Grading Criteria**
Evaluation is based not only on assessment of comprehension of the course concepts listed above, but also on student engagement and initiative in course exercises and activities. Grade is determined by:

**Description of Assignments**
- Participation: A critical part of learning on study abroad is the extent to which students extend themselves to take advantage of the opportunities available. Grade will reflect attendance, participation in discussions, contribution to group work, curiosity and inquiry, grasp of readings, etc. Occasional tasks may be used to assess knowledge of key concepts.
- Class Assignments: These will include problem sets and other exercises based on readings, class material, and excursions. Students are encouraged to work together, but each person must submit his or her own assignment.
- Group Project: Group projects in which students will demonstrate knowledge and ability to work with class concepts. Students display leadership and mastery of key concepts while training academic presentation and communication skills.

**Assessment**

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<thead>
<tr>
<th>Participation</th>
<th>10%</th>
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<tbody>
<tr>
<td>Class Assignments</td>
<td>50%</td>
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<tr>
<td>Group Projects</td>
<td>40%</td>
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</tbody>
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**Grading Scale**
- 94-100%  A  Excellent
- 90-93%  A-
- 87-89%  B+
- 84-86%  B  Above Average
- 80-83%  B-
- 77-79%  C+
- 74-76%  C  Average
- 70-73%  C-
- 67-69%  D+
- 64-66%  D  Below Average
- below 64  F  Fail

**Expectations and Policies**
- **Show up prepared.** Be on time; have your readings completed and points in mind for discussion or clarification. Complying with these elements raises the level of class discussion for everyone.
- **Have assignments completed on schedule, printed, and done accordingly to the specified requirements.** This will help ensure that your assignments are returned in a timely manner.
- **Ask questions in class. Engage the lecturer.** These are often very busy professionals who are doing us an honor by coming to speak.
- **Comply with academic integrity policies** as specified in the SIT Study Abroad Student Handbook: [http://www.sit.edu/SSA_Other_documents/Student_Handbook.pdf](http://www.sit.edu/SSA_Other_documents/Student_Handbook.pdf)
- **Respect differences of opinion** (classmates, lecturers, local constituents engaged with on the visits). You are not expected to agree with everything you hear, but you are expected to listen across difference and consider other perspectives with respect.
Please see the SIT Study Abroad student handbook for policies on academic integrity, ethics, academic warning and probation, diversity and disability, sexual harassment, and the academic appeals process.

**Please note:** the syllabus, course content, lecturers, and readings may modified by the Academic Director in order to better suit the needs of the course and its participants. Should any change of class topics or lecturers be necessary, students will be promptly notified.