GARP 0239-002 Seminar: Sustainable Energy (Fall 2010)

Location/Time: Wednesdays, 16:30 to 17:30 in Bates 05
Instructor: Dr. Carsten Braun, office hours MWF 12:00 to 13:00, Bates 217
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What is Sustainable Energy?

Sustainable energy is the supply of energy so that it meets our needs today without compromising the ability of future generations to meet their needs. A broad interpretation includes fossil fuels as transitional sources. A narrow interpretation includes only energy sources which are not expected to be depleted in a time frame relevant to humans.

Renewable (or sustainable) energy is an important piece of our energy future, but the largest opportunities are currently in energy conservation and efficiency.
(Source: http://www.smartenergysavings.net/).

This course explores sustainable energy as an alternative to our current fossil fuel-based energy system. Weekly readings and discussions will cover sustainable energy sources and technology, energy conservation, climate impacts, and policy choices. We will also incorporate the Stabilization Wedges Game and invite guest speakers to learn more about exciting technologies to reduce global greenhouse gas emissions. The specific topics and readings will depend on our interests.

Learning Goals and Outcomes

We have three ‘big-picture’ learning goals in this course:
1. Students appreciate issues of sustainability and equity within and between generations by acquiring an understanding of sustainable energy, climate/environment/social impacts, and policy choices.
2. Students practice critical thinking and analytical skills by reading, synthesizing, and discussion of a variety of different information sources related to sustainable energy.
3. Students practice effective communication by participating in and facilitating seminar discussions.

Course Logistics

We meet once a week to discuss the assigned readings. Readings may include scientific papers, magazine articles, online book chapters, suitable websites, etc. Typically, two students will serve as discussion facilitators each week: they will provide an overview/summary of the assigned reading (typically using MS PowerPoint) and then facilitate our discussion.

We will also ‘play’ the excellent Stabilization Wedges Game created by the Princeton Carbon Mitigation Initiative (see link below). The Stabilization Wedges Game is a team-based exercise that teaches players about the scale of the greenhouse gas problem, plus technologies that already exist to dramatically reduce our carbon emissions and get us off the path toward dramatic and damaging climate...
change. I will also try to invite suitable guest speakers to our seminar to learn more about what we all can do right now in terms of sustainable energy. I have a few ideas for guests, but any ideas would be appreciated!

**Class Meetings**
9/8, 9/15, 9/22, 9/29, 10/6, 10/20, 10/27, 11/3, 11/10, 11/17, 12/1, 12/8
No class 10/13 (Wednesday = Monday schedule)
No class 11/24 (Thanksgiving Recess)

**Seminar Schedule and Topics**

Our seminar is broadly-structured around three sections as summarized in the table below. Within each section we have a lot of flexibility to tailor the content and readings to our interests.

<table>
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<th>SEMINAR TOPICS</th>
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| **Part 1** The Big Picture | What is Sustainability? What is Sustainable Energy?  
Issue of equity within and between generations  
Energy use, energy efficiency, and energy conservation  
Fossil fuels and Peak Oil  
Anything else? |
| **Part 2** ‘Cool’ Technologies | Carbon Sequestration and Storage  
Geothermal Energy  
Nuclear Energy = Sustainable Energy?  
Electricity = The Solution?  
Sustainable Biofuels?  
The car of the 21st century  
Anything else? |
| **Part 3** Now What? | Stabilization Wedges Game  
Geoengineering? Clean Coal?  
The Economics: Carbon Taxes, Carbon Trading, Carbon Offsets  
Personal Action Plan  
Anything else? |

**Assessment**

| Attendance/Preparation/Participation | 200 points |
| Resource Portfolio | 100 points |
| Discussion Facilitator | 100 points |
| Personal Action Plan | 100 points |

It’s really pretty simple: Attendance is mandatory and you will lose 20 points each time you miss class. Preparation and participation are crucial; otherwise our discussions will be boring and lack substance. The resource portfolio is a compilation of useful resources, figures, papers, websites, etc. = essence a folder, binder, or document with reliable and organized information about sustainable energy. Each person will serve once as discussion facilitator and we will all develop personal action plans for ourselves.

*More details will be provided!*
Course Resources

  This is the free online version of David MacKay’s excellent textbook. The material gets a bit technical at times, but provides a solid foundation of sustainable energy sources.

- [http://needtoknow.nas.edu/](http://needtoknow.nas.edu/)
  This is an excellent website about energy from the National Academies – advisers to the nation on science, engineering, and medicine.

- [http://cmi.princeton.edu/](http://cmi.princeton.edu/)
  Princeton’s Carbon Mitigation Initiative – great resources, including the famous Stabilization Wedges Concept and Game.

  This is the website of the Union of Concerned Scientist with great information and resources about clean vehicles, clean energy, and other related topics.