

EES 306 Renewable Energy Spring 2010 Instructor: Fred Loxsom

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Texts

- Sustainable Energy* by David McKay, Published by UIT Cambridge, 2009, <http://www.withouthotair.com/>
- Tackling Climate Change in the US* by American Solar Energy Society, Charles F. Kutscher, Editor, January 2007, http://www.ases.org/images/stories/file/ASES/climate_change.pdf
- Renewable Energy Handbook* by William H. Kemp, Aztext Press, 2005. Available in the Eastern bookstore or from Amazon (\$21.65)

Catalog Description. Prerequisite: EES 205 or EES 204. A study of renewable energy resources and applications with emphasis on the use of renewable energy in residences, utility power generation, and transportation. Topics include solar hot water, solar electricity, wind power, geothermal energy, hydroelectricity, wave power, biofuels, and electric vehicles. The potential for renewable energy to replace conventional energy resources and to stabilize or reduce carbon emissions will be analyzed extensively.

Course Elements. This course has four major elements.

- **Basic Energy Science.** Students are expected to already have a basic understanding of the science of climate change, fossil fuels, solar radiation, wind energy conversion, hydroelectricity, electric power, and thermal physics.
- **Renewable Energy.** This course builds on student background to develop an in-depth understanding of energy conversion science and technology such as solar cells and wind power systems.
- **Calculations and Estimates.** Students learn to describe energy systems and their impacts on the environment in mathematical terms. For example, students estimate the size and cost of a solar electric system appropriate for a residential application.
- **Policy.** Students learn how to assess the impact of energy policies on energy costs and environmental impact.

Outline

Week of	Topic	Assignment Due Date
Residential Applications		
January 25	Energy Efficiency	January 31
February 1	Passive Solar	February 7
February 8	Solar Hot Water	February 14
February 15	Residential PV & Discussion 1	February 21
February 22	Residential Wind Power	February 28
March 1	Exam 1	March 7
	Residential Project Outline	March 7
Utility & Transportation Applications		
March 8	Utility Solar Power	March 14
March 15	Utility Wind Power & Discussion 2	March 21
March 22	<i>Spring Break</i>	
	Residential System Project	April 4
March 29	Hydroelectricity, Geothermal & Other Renewables	April 4
April 5	Fuel Cells & Combined Heat and Power	April 11
April 12	Fuel Cell Vehicles & Electric Vehicles	April 18
April 19	Biofuels & Other Biomass & Discussion 3	April 25
April 26	Eastern's Climate Action Plan	May 2
May 3	Exam 2	May 9
May 10	Term Paper Outline & Discussion 4	May 13
	Term Paper	May 21

Grading Exams -- 30% Weekly Assignments -- 34% Discussions -- 12%
 Residential System Project -- 12% Term Paper -- 12%

Independent Inquiry Projects

Residential System Project. You will design a renewable energy system (solar thermal, PV, or wind) system for an existing residential building to which you have access (e.g. your home). An outline of the residential project is due March 7 and the complete residential project is due April 4. The completed project will include a site survey, a detailed system description (components, size, installation), and a cost estimate, including state and federal incentives.

Term Paper. In this course and other courses in the energy track (e.g. EES 205), we have used cost and carbon emission reduction as the main criteria for judging the value of energy technologies and energy policies. Your task in this paper is to critically examine these criteria and other criteria used to justify policies or strategies that promote greater energy conservation and greater investment in renewable energy. You can use your personal energy use, campus energy, use or national energy use as the context for this analysis. Based on your analysis, you will describe and justify your personal philosophy about these policies. You don't have to espouse an environmentalist position, but you must justify your stance. An outline of your paper is due May 13 and the complete paper is due May 21. The completed paper will include an introduction, a summary of arguments used to promote sustainable energy, your analysis of these arguments, your position, and a conclusion. Write the report as if it were a newspaper editorial or opinion pieces.

Discussions

Discussion 1. State and federal incentives for PV and solar thermal systems have reduced their payback time. What additional incentives do you think are needed to encourage broader adoption of this technology?

Discussion 2. Although utility scale wind and solar systems can help substantially reduce US carbon emissions, some people reject these systems for aesthetic and environmental reasons. What principles do you think should guide policies about where to site wind farms and CSP projects?

Discussion 3. Three technologies are competing to be the dominant type of sustainable transportation – electric vehicles, fuel cell vehicles, and biofuel-powered vehicles. Which of these technologies do you think will become the most important technology and what factors will determine which of these technologies dominates?

Discussion 4. Your term paper will describe and justify your position on renewable energy policy. Describe how your liberal arts education at Eastern has enabled you to look at this issue not only as a scientist, but also from various perspectives – economic, political, social, and ethical.

Tier 3 Requirement. Effective Fall 2008, all incoming students entering Eastern as new first time freshmen or transfer students are required to complete a Tier III course in their major. We have applied to have EES 306 satisfy the Liberal Arts Curriculum Tier III course for students in the EES Energy Science track.

Students with Disabilities. Students with disabilities who may need accommodations for this course are encouraged to contact the Office of AccessAbility Services at 465-5573. Your instructor is unable to make such accommodations until he receives written notification and instructions from this office.

Cheating and Plagiarism. The following material is taken from the "Statement on Campus Rights and Responsibilities" which is found on page 67 of the ECSU Student Handbook

A student using other than approved materials when taking a test or who gives or receives information during an examination is guilty of cheating.

Plagiarism is presenting the work of others as one's own. The "work of others" includes any work bought or borrowed from another student as well as work copied from a book, magazine, newspaper, or other medium.

Complicity in another's act of plagiarism is itself an act of plagiarism. These acts are considered academic violations and are covered by the Statement on Campus Rights and Responsibilities.

Discovery of cheating or plagiarism could lead to the maximum sanction of course failure and expulsion from school.