

Professor Barry Rugg
Energy Generation and Environmental Impact
V36.0350
TR 9:00-10:15 AM

Aims of the course: This course will provide a comprehensive overview of major topics in energy generation and their impact on our environment. The course will be technical and require an understanding of the vocabulary of energy including the concepts of work, energy and power. Some basic chemistry and thermodynamics will be introduced so as to permit the students to perform comparative analysis of energy systems. An introduction to life-cycle cost estimation will be included. Associated environmental impact calculations for energy systems will be presented.

Syllabus. (Readings refer to chapters in Aubrecht; see below)

Week 1: Introduction to Energy and its vocabulary (Aubrecht, 1-3)

Week 2: Generation, transmission and distribution of electricity (Aubrecht, 4,5,&8)

Week 3: Chemical energy and thermodynamics (Aubrecht, 6,7)

Week 4: Conservation and recycling of resources (Aubrecht, 9-11)

Week 5: Midterm#1. Lectures: The fossil fuel resource and an introduction to carbon chemistry (Aubrecht, 12)

Week 6: Pollution and environmental impact of electrical generation (Aubrecht, 13, 14)

Week 7: Environmental impact of cars and other modes of transportation (Aubrecht, 15)

Week 8: Climate change; the greenhouse effect (Aubrecht, 16, 17)

Week 9: Nuclear energy resources, nuclear reactions and power generation (Aubrecht, 18, 19)

Week 10: Midterm#2. Nuclear safety and nuclear waste disposal (Aubrecht, 20)

Week 11: Solar Energy; wind, photovoltaic and water derived energy systems(Aubrecht, 21, 22)

Week 12: Biomass energy, alcohol fuels from corn or cellulose? (Aubrecht, 23)

Week 13: Energy storage; the hydrogen economy (Aubrecht, 25)

Week 14: Energy and environmental impact economics (class notes)

Final Exam: Cumulative, with emphasis on weeks 10-14.

The text:

Energy

Physical, Environmental and Social Impact (3rd Ed.)

Gordon J. Aubrecht 2006 by Pearson Education, Inc.

676 pages, ISBN: 0130932221

This introductory textbook is written by a physicist and presents a balanced view of energy technology and its environmental and social impact. It is highly descriptive with limited quantitative content and as such must be supplemented with class notes.