EK 408 Introduction to Clean Energy Generation and Storage Technologies

Fall 2010

Course Syllabus

TEXT BOOK
Fundamentals of Renewable Energy Processes by Aldo V. DaRosa, 2nd Edition

SUPPLEMENTARY REFERENCE
Sustainable Energy by J. W. Tester, E. M. Drake, M. J. Driscoll, M. W. Golay and W. A. Peters
Other reading materials will be handed out in class

CLASS SCHEDULE
Lecture: Classroom GCB 204, Tuesdays and Thursdays 12-2 PM

INSTRUCTOR Prof. S. N. Basu (Tel.: 617-353-6728, e-mail: basu@bu.edu)

Office: Room 204, 730 Commonwealth Ave.
Office Hours: Friday 2.00 – 3.00 PM
Other appointments must be scheduled in advance.

GRADING

Midterm 1	30 %
Midterm 2	30 %
Homework	10 %
Project	30 %

EXAMINATIONS
The course will have two midterms. Each examination will cover roughly half the course material.

HOMEWORKS
There will be 6 homework sets handed out. The homework solutions will be typically due at least a week from the date they are handed out. Collaborative discussion of the concepts and approach behind the homework questions is allowed; copying the answer from another student is strictly prohibited and will be grounds for disciplinary action.

PROJECT

The project will be undertaken by groups of two or three students. The deliverables will include an oral presentation in class (15 points) and a written report (15 points). The group should pick any current clean energy generation or storage technology and address the topics below. Groups with 2 students need only address the first two topics.

Topic 1: Overview of the technology chosen, and its advantages and challenges.

Topic 2: One major challenge limiting this technology and the current ongoing research to meet this challenge. The science and engineering principles should be clearly laid out.

Topic 3: What is its current state of implementation and current and projected market penetration of this technology? Who are the major players?

LECTURE SCHEDULE

Class	Day	Month	Date	Year	Comments
1	Thursday	September	2	2010	Lecture
2	Tuesday		7	2010	Lecture
3	Thursday		9	2010	Lecture
4	Tuesday		14	2010	Lecture
5	Thursday		16	2010	Lecture
6	Tuesday		21	2010	Lecture
7	Thursday		23	2010	Lecture
8	Tuesday		28	2010	Lecture
9	Thursday		30	2010	Lecture
10	Tuesday	October	5	2010	Lecture
11	Thursday		7	2010	Lecture
-	Tuesday		12	2010	No class (Monday schedule)
12	Thursday		14	2010	Lecture/Review for Midterm 1
13	Tuesday		19	2010	**MIDTERM 1**
14	Thursday		21	2010	Lecture
15	Tuesday		26	2010	Lecture
16	Thursday		28	2010	Lecture
17	Tuesday	November	2	2010	Lecture
18	Thursday		4	2010	Lecture
19	Tuesday		9	2010	Lecture
20	Thursday		11	2010	Lecture
21	Tuesday		16	2010	Lecture
22	Thursday		18	2010	Lecture
23	Tuesday		23	2010	Lecture
-	Thursday		25	2010	No class (Thanksgiving break)
24	Tuesday		30	2010	Lecture/Review for Midterm 2
25	Thursday	December	2	2010	**MIDTERM 2**
26	Tuesday		7	2010	**Project Presentations**
27	Thursday		9	2010	**Project Presentations**

COURSE TOPICS

1. Introduction **1 week**
Planetary energy resources and utilization
Carbon cycle, photosynthesis, C sequestration

2. Fuels **0.5 weeks**
Fossil fuels
Nuclear fuels
Biomass

3. Introduction to thermodynamics **1 week**
Thermodynamics
Kinetic theory of gases

4. Thermal Energy Conversion **1.5 weeks**
Mechanical heat engines
Gas turbines
Thermoelectric converters

5. Energy from hydrogen **2.5 weeks**
Fuel cells
Hydrogen generation technologies

6. Energy storage **1.5 week**
Hydrogen storage technologies
Batteries
Other storage technologies

7. Energy from the sun **1.5 weeks**
Solar radiation
Solar collectors
Photovoltaic converters

8. Energy from wind and water **2 weeks**
Wind energy
Hydroelectric power generation
Ocean energy

9. Team project presentations **1 week**