EK 408 Introduction to Clean Energy Generation and Storage Technologies

Fall 2013

Course Syllabus

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

SUPPLEMENTARY REFERENCES
Sustainable Energy, by J. W. Tester, E. M. Drake, M. J. Driscoll, M. W. Golay and W. A. Peters
Principles of Sustainable Energy, F. Kreith and J.F. Kreider
Renewable Energy and Climate Change, V. Quaschning
Other reading materials will be handed out in class

CLASS SCHEDULE
Lecture: Classroom PHO 201, 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, 1.30 – 2.30 PM
Other appointments must be scheduled in advance.

GRADING AND SCHEDULE

Exam 1	35 %
Exam 2	35 %
Project	30 %

EXAMINATIONS
The course will have two exams. Each exam will cover roughly half the course material. The dates of these exams will be announced in class and homework solutions will be discussed in class before the exams.

HOMEWORKS
Homework sets will be handed out but will not be collected or graded. It is strongly suggested that you try to solve the homework problems independently. Homework solutions will be typically available a week after the homework questions are handed out.

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?

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 weeks**

Fuel cells
Hydrogen generation technologies

6. Energy storage **1 week**

Hydrogen storage technologies
Batteries
Other storage technologies

7. Energy from the sun **2 weeks**

Solar radiation
Solar collectors
Photovoltaic converters

8. Energy from wind and water **1.5 weeks**

Wind energy
Hydroelectric power generation
Ocean energy

9. Project presentations **1 week**