Syllabus for Chem. 3700

Alternative Energy

Class Meetings:
Tuesdays and Thursdays,

Credit Hrs: 3

Course Description:
This course will give a general overview of the most popular alternative energy sources which are currently being used or developed to help relieve the world dependence on fossil fuels. The basic scientific principles governing the current and future approaches in solar photo-voltaics, fuel cells, biomass conversion, nuclear energy and wind power will be presented. Though the course will focus on the basic principles and fundamental science underpinning the current advancements in energy technologies, there will also be an emphasis on understanding the economic, political, and general sustainability issues associated with the most popular alternate energy options. Due to the interdisciplinary nature of the topic, the course would involve multiple instructors from across the campus.

Many class periods will involve a discussion of a reading assignment or an in-class presentation. For each of these classes you will be required to submit a discussion point that is based on the assigned reading or presentation. You will be required to submit this by 11 PM the day the
reading assignment is given. Write a few sentences about your discussion point and include any supplementary material that would help others in the class appreciate the topic (e.g. images, websites or other scientific papers). You will be graded on the quality of your discussion point and be prepared to share it with the class.

You will be required to read and provide a critical written and oral report for one additional book or topic on alternative energy. You will have a final project that will be a critical written and oral report concerning a current hypothesis regarding alternative energy or a small group (2-3 students) demonstration and testing of a basic alternative energy technology.


Note: Information will be presented and distributed from other sources. There will also be other required reading assignments given throughout the course.

Notes on grading:
25% will be based on the written homework questions and discussion points that you submit through T-Square for each assigned reading. Late submissions will not be accepted.

10% will be based on class participation. This grade includes active participation in discussions and presenting your discussion points to the class.

20% will be based on your written report/critique of the book or article that you choose for individualized reading. Books/articles must be approved in advance. No more than two students can select the same book/article.
20% will be based on your end-of-term project – this shall be a small group (3-4 students) demonstration and testing of a basic alternative energy technology.

25% will be based on a final written exam.

**Schedule**

**Aug. 21, 23**
Introduction to the course
- What is the world energy inventory and projected use?
- General discussion of needs for alternative energy options. (What are the global atmospheric/climate change drivers?)

**Aug. 28**
- Discussion of world’s fossil fuel reserves and social climate/policy.
- Where are we and where do we go from here?

**Aug. 30 – Sept. 4**
- Introduction to basic thermodynamics, energetics and overview.

**Sept. 6, 11**
- General discussion regarding the viability of wind power
- Predictability of wind patterns
- Geographical selections

**Sept. 13, 18, 20**
- General discussion of basics of solar energy
- The need for solar photovoltaics
- Current approaches in solar cells
- The “new age” of solar cells and solar technology

**Sept. 25, 27**
- The need for solar production of fuels
- Catalysis for fuels conversion

**Oct. 2, 4**
- Overview of the political climate of solar
• Overview of the commercial viability of solar fuels

Oct. 9, 11
• Energetics of hydrogen production
• Water splitting and hydrogen production
• General discussion of a potential “Hydrogen economy”
• Hydrogen/nuclear energy

Oct. 13 – 16, Student Recess

Oct. 18 Written Report Due

Oct. 23, 25
• General discussion regarding the viability or nuclear power
• The need vs. the political climate
• The basics of nuclear energy
• Nuclear waste issues

Oct. 30, Nov. 1
• General discussion of modern fuel-cells
• Solid-oxide fuel cell operations
• Proton membrane based fuel cells.
• What are the barriers to a hydrogen economy?

Nov. 6, 8
• Biomass conversion
• The energetics of biomass conversion
• How do you choose a “fuel –stock”
• Goals, options and limitations
• Fuel production from algae

Nov. 13
• An overview of geothermal energy

Nov. 15
• An overview of wave/tidal energy
Nov. 20
- Alternative energy and the global economy
- The role of technology in sustainable future
- The role of society and policy

Nov. 23 – Thanksgiving Recess

Nov. 27, 29
- Oral presentations of projects

Dec. 4 and 6
- Oral presentations of projects

Dec. 10 -14, Final Exam Week

Note: This schedule may change slightly based upon class consensus and in-class focus discussions. All changes will be announced several days in advance.