

## Chemical Engineering 310 Energy and the Environment

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8:00 a.m.-9:30 a.m.  
Tuesday and Thursday  
393 CB

**Professor:** Thomas H. Fletcher; 350E CB; 422-6236

**Teaching Assistant:**

**Office Hours:** As available, or by appointment.

**Required Text:** "Energy Systems and Sustainability," by Boyle, Everett, and Ramage, Oxford Press, 2003 (ISBN 0-19-926179-2).

**Supplementary Material:** The DOE Energy Information Agency (EIA) web pages will be used extensively in this class (<http://www.eia.doe.gov>).

**Recommended Reading:**

Boyle, G., Renewable Energy, 2<sup>nd</sup> Edition, Oxford University Press (2004). This is the follow-on book to the required text book for this class.

Lomborg, Bjørn, The Skeptical Environmentalist, Cambridge (1998).

Yergin, Daniel, The Prize, The Epic Quest for Oil, Money, and Power, Simon and Schuster, New York, New York (1991). (Very interesting history of petroleum discovery, marketing, and politics, including influence of Churchill, Hitler and Sadaam Hussein).

Crichton, M., State of Fear, Harpercollins (2004). (Fictional adventure-like story line, but lots of facts; perhaps the first popular fiction book that pokes fun at the environmentalist movement)

**Course Objectives:**

1. To review the history of energy use, the energy supply problems that have existed in the past, that exist today, and the potential for problems in the future
2. To examine current, conventional sources of energy, their availability, and current cost.
3. To briefly examine alternate sources of energy, their technical feasibility, and, if possible, relative cost.
4. To develop an appreciation of the role of energy in our society, and how it affects life style.
5. To have the students evaluate their own energy use patterns, and to develop ways for them to minimize the impact of energy problems in their own lives.
6. To introduce the chemical engineering student to the field of combustion.

**Course Prerequisites:** Chemical Engineering 273 or equivalent.

**Grading:**

Reading questions and class participation	25%
Summary writing assignment	5%
Attendance/Punctuality	5%
Current Events	5%
IPP Tour	5%
Combustion homework	10%
Midterm exam	30%
Final exam	15%

**Class Discussion:** This class will be taught in a different manner than most engineering courses in order to enhance student learning. Originally, this class was heavily lecture-oriented, with students feeling like a fire hose had been attached to their mouth at the end of the class period. Overheads full of information were passed before the class, hoping for learning to take place. A different philosophy is currently employed in this course, where student learning is emphasized, rather than mere presentation by the instructor. This will be accomplished in the following manner:

1. Students will be divided into groups of about four students.
2. Reading questions are placed on the class web page. Please be sure to check for updates the day before class.
3. Students are expected to read the assigned material, and then meet as a group to discuss the reading material.
3. Student groups will each prepare one set of responses to the reading questions that will be suitable for presentation to the class. Responses will be in powerpoint files on a portable USB drive. Please do not make the format too fancy. Focus on content rather than graphics and style. Good engineers learn how to be efficient with their own time and the time of others.
4. One student from the class will be randomly selected and asked to present their group's answers to the class.
5. Student presentations will be graded mostly on preparation and effort. If a student has made a good effort to find the correct response, but is not quite correct, full credit will be given. This encourages independent thinking, rather than trying to find "the answer" expected by the professor. If the student cannot answer without help from the group, points will be deducted from the group score for that day. The entire group will receive the grade earned by the presenter.
6. One presentation from each group will be turned in each day and graded for preparedness. Powerpoint files should be printed with 6 slides to a page, and the name of each person in the group should be on the front page. These printouts are good for taking notes during class. It is okay to turn in the printed presentation with hand-written notes. The TA will hand back the assignments at the beginning of the next class period.

This format is quite different than the usual 100% lecture format. I have used this format in a graduate class (ChEn 733) and in this class (ChEn 310), and the students have enjoyed the learning method. I have assigned 25% of the grade for classroom participation (20% for answers to reading questions and 5% for general participation). You need to regularly participate in the class discussion to receive the full points for general participation. Every student will be required to make one intelligent comment or question per week to receive full credit; the TA will be keeping track.

**Homework:** The preparation for the class discussion takes the place of homework in this class. A few of the "reading questions" will be of the problem-solving type. During the combustion section, more traditional homework will be required.

**Summary Writing Assignment:** A one-page summary is required for each energy source discussed in class. In effect, this will be like a journal entry. All pages will have the same format, and answer similar questions, such as availability, cost, and environmental impact. A sample summary sheet is provided on the web page, along with a list of energy sources to be included. **Professor Plea: please do this assignment as you go through the class, rather than the night before it is due!**

**Lab Tour:** We will go on one lab tour this semester to visit the IPP coal-fired power plant near Delta, Utah. The tour will last about 2 hours, but it takes 1.5 hours to drive there (each way). We will do this on a Thursday morning in order to minimize the conflicts with other classes. A one-page trip report is required, summarizing what you learned on the trip.

**Current Events:** One of the goals of this class is teach students to read current newspaper and magazine articles that are energy-related and be able to give informed opinions regarding those events. The first 5-10 minutes of every class will be devoted to discussion of current events. Students are required to bring in one article per week to discuss. This will be monitored and worth 5% of the grade. Daily Universe articles are not acceptable unless written by an AP or UPI service.

**Exams:** Two exams are scheduled: a midterm exam and a final exam. The midterm will be an in-class exam, and will cover the energy aspects of the course. The final exam will cover only the combustion aspects of the course. **The final exam is scheduled for Monday, December 18, from 11:00 a.m. to 2:00 p.m.** Please plan your travel plans, etc., so that you can attend the final exam.

**Late Assignments:** Assignments are due at the beginning of each class period (to discourage students from working on assignments during class). Assignments will be docked 50% if they are late, and will be accepted for only one week after the assigned date. If there are printing problems, and the printed presentation pages are not available at the beginning of class, but turned in by noon that same day, the late penalty will only be 10%.

**Attendance/Punctuality:** Due to the discussion nature of this class, attendance is quite important, as is punctuality. When people come in late, it disrupts the flow of the class. Attendance and Punctuality will count for 5% of the grade.

**Cell Phone Policy:** Cell phones can be a major disruption of class. Please make sure that cell phones are off during class time. If your cell phone rings, you will be required to bring donuts to the next class period.

**Standards:** It is a privilege to attend BYU; lots of students would like to come, and the Church uses a tremendous amount of tithing dollars to support the University. You have signed an agreement to abide by university standards, including grooming, dress, and conduct. Thank you for your integrity in following these standards; any infractions will be dealt with as appropriate. Please call the Honor Code Office at 422-2847 if you have questions about those standards.

**Ethics:** In keeping with the principles of the BYU Honor Code, students are expected to be honest in all of their academic work. Academic honesty means, most fundamentally, that any work you present as your own must in fact **be** your own work and not that of another. Violations of this principle may result in a failing grade in the course and additional disciplinary action by the university. Specific ethics concerns for this class are:

1. Use of exams from previous years will be considered an honor code violation in this class.
2. All papers should be done on an individual basis.
3. Group presentations should have contributions from all members of the group; you will be asked to evaluate the performance of your partners in the group.

**Preventing Sexual Discrimination or Harassment:** Sexual discrimination or harassment (including student-to-student harassment) is prohibited both by the law and by Brigham Young University policy. If you feel you are being subjected to sexual discrimination or harassment, please bring your concerns to the professor. Alternatively, you may lodge a complaint with the Equal Employment Office (D-240C ASB) or with the Honor Code Office (4440).

**Students with Disabilities:** If you have a disability that may affect your performance in this course, you should get in touch with the office of Services for Students with Disabilities (1520 WSC). This office can evaluate your disability and assist the professor in arranging for reasonable accommodations.