Chem 370 / ENTS 369: (Solar) Energy Conversion and Solid-State Devices **Carleton College**
Section 00 **GENERAL INFORMATION (Syllabus)** **Spring 2003**

Instructor (i.e., who to throw your rotten vegetables at)

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NO, that's **not** me you saw modeling underwear in the Sears catalog. Sheesh!
(Props out to Mike Olson for putting together this frightening image…)

Overview

Chemistry 370 / ENTS 369 is a one-term intermediate-level interdisciplinary course. The subject matter is not horribly advanced, but it simultaneously involves mathematics, chemistry, physics, economics, and political science; what makes it challenging is its breadth, not its depth. This course will really consist of two distinct parts: were it a physics course, I'd make it two 5-week offerings! We will begin by learning the science that underlies solid-state devices like diodes and transistors, and electrochemical devices like batteries and fuel cells. An understanding of these topics will lead us into the topic of solar energy conversion, which will necessarily entail some discussion of economics and politics in addition to science. Economics and geopolitical matters will become our central focus in the second half of the term, when we discus local and global energy policy.

So, expect a broad, interdisciplinary course that will excite every part of your brain! I have one very particular piece of advice for you: in this course, above all others, it is critical that you do a little every day. Keep up. Don't put this course off and expect to cram it. It's easy to digest in small chunks, but gorging your brain on it will leave you with a splitting headache and little more understanding than you started out with. ***This class will not be a spectator sport!*** *What you get out of it will scale exponentially with what you put into it!*

Prerequisites

You should come into this course already familiar with the basics of three fields: chemistry, physics, and mathematics. Specifically, I will assume that you understand the basics of atomic structure and bonding, the physics of electric charges and fields, and the mathematical concepts underlying derivatives and integrals.

Class Meeting Times

Chem 370 / ENTS 369 meets Mondays, Wednesdays, and Fridays during period 4a in Olin G02. We'll start promptly, so please arrive on time: by 12:30 p.m. on Mondays and Wednesdays, and by noon on Fridays.

Grades and Assessment

I will give homework on a semi-regular basis. This will be a learning tool, and I encourage you to work with others on it; however, it is critical that you come to understand it. My present plan is to give one exam, covering the first five weeks of the course, which will be similar to the problems on the homework and/or will ask you about the real-world implications thereof. If you work diligently on the homework and really come to understand it, you will have no trouble whatsoever with the exam. If you let someone else think through the homework for you, you will do dismally. I'll assess the second half of the course with a project, whose nature will depend on what we choose to focus on in the last five weeks.

Special projects will be offered periodically as a way to bolster your grade. Examples include devising new homework questions and solutions, critiquing documents (like web pages) describing the course subject matter, and preparing pop-science explanations of your own for solid-state and/or electrochemical devices. You are free to propose your own special project ideas as well. Doing a great special project will appreciably help remedy a mistake made on the exam or project; but if you work hard on the homework and thus ace the exam, and you do diligent work on your project, you'll have no reason to do a special project in addition.

Required Texts

The following book and packet are required. I'll assume you have ready access to all the information in them:

The Consumer's Guide to Effective Environmental Choices: Practical Advice from the Union of Concerned Scientists, Michael Brower and Warren Leon, Three Rivers Press (1999, 2002). ISBN: 060980281X

Chem 370 / ENTS 369 Reading Packet, various authors. Available in the Carleton bookstore.

I have not been able to find a textbook that shares my concept-centered approach to solid-state physics, (or one that appreciates its neat connection to electrochemistry, for that matter,) so the best I could do was assemble a packet of readings. You can find said packet in the bookstore. It may well set you back more than the UCS book, but it's cheaper than the textbook alternative and much, much closer to what I'll be teaching.

Homework

On a semi-regular basis, I will assign some form of homework. Each assignment will have a due date, which will become progressively less negotiable as it approaches. If you are swamped, or are having trouble with the homework, please let me know as soon as you get the jitters. I will do my level best to ensure that you get each homework well before it is due and that each one is completely workable in light of what you have learned at that point in time. ***Assignments will not be accepted after the due date! I'm sorry, no exceptions!***

I encourage you to help each other **understand** the homework. However, plagiarism of solutions from other students, textbooks, or any other source is NOT permissible. I expect each of you to personally complete the homework you hand in, and be able to individually reconstruct the work you hand in, entirely on your own. Now I don't want to go off on a rant here, but I don't tolerate cheating. I'm a pretty libertarian academic mind, but if you ever intentionally do anything that takes unfair advantage of me or your fellow students, expect no mercy from me. *I will periodically do things to entrap people who are cheating. You have been warned.*

When the homework consists of written problems, you must show and explain your work (in detail) for full credit. Please make your work neat and legible, so I can grade it and you can learn from any mistakes you might have made. ***I will not grade illegible, disorganized work! Please recognize that I'm far less interested in your final answer than I am interested in how you arrived at it! There often is no one "right" answer!***

Office Hours and Extra Help

I post office hours online and outside my office door. I will adjust these hours, or dump them entirely, in response to their level of utilization. Official office hours or no, feel free to call or drop by my office anytime to see if I am available to answer questions (with the exception of just before class, when I panic...er, I prep for class, yes, prep for class). You may also schedule an appointment to see me. E-mail is the best way to do that. I'm around quite a bit, and if you find me in my office when you stop by, don't be shy, it's OK to just pop in.

Electronica

I have set up a web page for this course, mostly to provide links I mention in class. This will save me from writing and you from copying down long, nasty URL's. Unfortunately, I will still have to give you and you will have to type in the long, nasty URL for the homepage:

http://www.acad.carleton.edu/curricular/CHEM/courses/rrossi/Chem370_S03/

You can also access it via the Carleton homepage, through the chemistry or ENTS departments:

(Academic Departments:Chemistry:Courses:Chem 370:Spring 2003) -or-
(Academic Departments:ENTS:Courses:ENTS 369)