

**Chem 2/APh 2**  
**COURSE SYLLABUS**  
**General Information**

**Course Instructors:**

Douglas C. Rees

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Professors Rees, Bellan, and Lewis will plan the curriculum, deliver the lectures, and write the examinations. Any feedback regarding the overall nature, content, and pace of the course should be directed to them.

**Course Coordinators:**

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The coordinators are responsible for the general course administration. Questions about adding or dropping the course, changing sections, correcting any problems or errors in grading, submitting late assignments, and other administrative issues should go exclusively to them.

**Classes****Hours**

10 a.m. – 11 a.m., Tuesday 100 Broad

1 p.m. – 2 p.m., Wednesday, Friday 100 Broad

On Mondays, the class will be divided into three recitation sections, which the teaching assistants (T.A.'s) lead. Your recitation T.A. and the location of your section will be given to you on the second day of class.

**Text**Chemistry of the Environment 2nd Edition, by Thomas G. Spiro, William M. Stigliani

Published by Pearson Education (Prentice Hall) ISBN#: 0-13-754896-6

This text is required for Chem 2/APh 2 and may be purchased at the Caltech Bookstore.

**Library Reserve Materials**

Three copies of the Textbook are available on closed reserve; you may use these for three hours at a time in the library and/or check them out overnight after 10 p.m.

**Course Outline**

These are the abbreviations used in this schedule:

HW Homework

Q

Quiz

Topic	Mon.	Tues.	Wed.	Fri.
Global Energy Perspective Fossil Energy - Oil Fossil Energy - Coal		30 March	31 March	2 April
Renewable Energy Photovoltaics, Artificial Photosynthesis Fuel Cell theory	5 April	6 April	7 April HW 1 out	9 April
Fuel Cell systems Batteries Hydrogen Economy and Storage	12 April HW 1 due	13 April	14 April	16 April HW 2 out
Alpha, beta, gamma radioactivity, neutrons; rest mass energies, nuclear binding energy, fission v. fusion Organization of nuclear processes, table of the nuclides, radioactive series Cross sections, nuclear force v. electrostatic repulsion, patterns in table of the nuclides	19 Apr.	20 Apr.	21 Apr. HW 2 due	23 Apr.
Fission process and cross-sections, enrichment, fission products, moderators, breeding, plutonium Fission reactor types, neutron economy, reactor design, reactor control, economics, Chernobyl Fission issues: Enrichment, spent fuel, nuclear waste, plutonium, reprocessing	26 Apr.	27 Apr.	28 Apr. HW 3 out	30 April
Fusion processes, deuterium-tritium and other examples, main issues, comparison to fission Fusion and plasma physics, Lawson criterion, tokamaks, heating, confinement, reactor scenario, tritium cycle Non-tokamak fusion concepts, self-organizing plasma confinement configurations, Caltech research	3 May HW 3 due	4 May	5 May	7 May HW 4 out
Introduction to bioenergetics. The thermodynamics of biological energy production.	10 May	11 May	12 May HW 4 due	14 May
Kinetic aspects of bioenergetic processes. The molecular and cellular organization of bioenergetic systems. Photosynthesis I	17 May	18 May	19 May HW 5 out	21 May
Photosynthesis II Respiration and ATP synthesis Haber-Bosch process and biological nitrogen fixation	24 May HW 5 due	25 May	26 May	28 May HW 6 out
***Debates and Field Trips	31 May	1 June	2 June HW 6 due	3 June
***Finals Week	7 June	8 June	9 June	11 June

**Website:** [mmrc.caltech.edu/~lwebb](http://mmrc.caltech.edu/~lwebb)

## Grades

Chem 2 is graded on a letter grade basis only.

### Homework and Quizzes

6 homework assignments will be handed as indicated, and each will be due by 5:00 p.m. on the date indicated. Each homework assignment is worth 10% of your final grade. *All homework assignments must be completed and turned in; otherwise, **you will fail this course!!!*** Three days after the due dates of problem sets, answer keys will be placed on reserve in Millikan Library.

### Late Assignments

Late homework assignments will be accepted, but your score will be reduced unless you have a remission slip signed by the course coordinator.

- Between 5 minutes and 24 hours after the due date and time, your score will be reduced by 40%.
- Between 24 and 48 hours after the due date and time, your score will be reduced by 70%.
- After that, your score will be reduced by 100%. However, **you must still complete and turn in all of the problem sets to pass this course**, even though you will not receive any additional points to your homework score.
- Remission slips will be granted only if you are under extenuating circumstances. Contact one of the Course Coordinators if you need a remission slip.

### Final Examination

The final exam is comprehensive and worth 40% of your final grade. Like the homework, it is take-home. **All of your exam work should be written legibly in a "bluebook,"** available at the Caltech Bookstore for 25¢, and handed in to the Chem 1 Box by the specified date and time.

### Submission of Work

Do not turn in any work to your recitation section T.A. **All homework and examinations should be turned in to the Chem 1 Box**, located in the mailroom of the Student Activities Center. Here, there are separate slots for problem sets and quizzes/exams, and a stapler is provided in the bottom cabinet. **Please put your name, section letter, and T.A.'s name on all work you submit.** Also, please write legibly, as any unintelligible work will not be graded.

### The Honor System

You are encouraged to help each other understand the concepts of the homework material. However, plagiarism of solutions from other students, textbooks, or any other source is a violation of the Honor Code. You must personally complete all work you turn in under your name, and you must be able to reconstruct this work on your own. Some questions on the problem sets will be designated as "no collaboration." These specific problems, as well as all quizzes and examinations, must be solved with no discussions whatsoever among students.

### Ombudsperson Meeting

For this class, a student representative will be chosen to report to the executive officer about the progress of the course. If you have any complaints or suggestions about the course, please direct them to your house Ombudsperson before these meetings. However, please feel free to contact either the class coordinators or Professors about any issues of immediate concern.

### Recitation Teaching Assistants

The recitation sections are smaller, discussion-oriented sessions where you may ask your T.A. questions about the subject material of the lectures or any other topics you may find confusing. Each section will also address solving the types of problems you will encounter on the homework and examinations. It is suggested that you do as much of the homework as possible before recitation, so that the discussion can focus on the most relevant difficulties.