

Chemistry 31A, Autumn 2009

Chemical Principles I: Structure & Energetics

Professors Chidsey, Dai, & Schwartz

Course Overview:

The science of chemistry evolves through a process of observation, hypothesis, and experimentation. This course is structured to develop your skills to participate in this process while building your understanding of how chemical phenomena shape our world.

Broad Scientific Objectives:

- *Observation and Conceptual Modeling:* Recognize patterns in observations of chemical phenomena and construct conceptual models to explain the phenomena.
- *Explanation and Estimation:* Apply conceptual models to qualitatively explain a wide range of phenomena and to make quantitative estimations.
- *Problem Solving:* Develop critical thinking skills to analyze and solve problems in chemistry.
- *Communication:* Develop skills to discuss chemical concepts and explain your thought processes and conclusions in writing

Specific Chemical Objectives:

- *Stoichiometry:* Predict the amounts of species consumed in a reaction and the amounts of products formed.
- *Structure:* Identify the interactions among nuclei, electrons, atoms and molecules, and how they determine the structures and properties of pure substances and mixtures.
- *Energetics:* Determine the types and amounts of energy change accompanying reactions and phase changes.
- Be prepared for the study of chemical dynamics in Chem 31B: Chemical Principles II.

Typical Schedule - The two-week learning cycle:

- *First Section:* Observe and experiment with various substances to gain experience with the chemical phenomena covered in that learning cycle.
- *First Lecture:* Begin to develop an understanding of the phenomena and models of the cycle.
- *First Weekend:* Summarize your findings from section and analyze them in a written report based on the first lecture and assigned reading.
- *Second Week:* Further develop your understanding of the phenomena and models, and your skill to solve chemical problems through assigned reading and exercises, discussion and quizzes in lecture, and small-group argument and problem solving in the second section. By the end of the week, make an initial, individual attempt on each of the problems in the problem set.
- *Second Weekend:* Discuss and check your answers to the problem set with classmates and seek guidance as needed from the instructional team. Then, individually prepare your own solutions.
- *Exam Preparation:* Practice additional problems in lecture and review the solutions to the problem set to seek a full understanding of the problems you found most difficult. You may further challenge your problem solving skills with additional problems from previous exams. The last lecture will be a review of the key phenomena and models in the cycle.
- *Exam:* Complete an exam at the end of the cycle to assess your understanding and skills.

General Information and Course Structure

Instructors: [Professor Chris Chidsey](mailto:chidsey@stanford.edu) [Professor Hongjie Dai](mailto:hdai@stanford.edu) [Dr. Jennifer Schwartz](mailto:jks425@stanford.edu)
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Web Site: www.stanford.edu/class/chem31a is the publicly accessible portion of the website. A few hours after registering for Chem 31A on Axess, you will have access to the full [Chem 31A CourseWork web site](#) for access to all course materials, archived announcements, your section assignment and your scores on graded work.

Required Text: Spencer, Bodner and Rickard, Chemistry: Structure and Dynamics, 4th Ed., 2008.
optional: Student Solutions Manual (not essential)

Required PRS Transmitter: You must have a hand-held PRS RF transceiver (available at the Stanford Bookstore) to answer quizzes that will be given at the beginning of lectures on days when assigned reading and reading problems are due (see [Calendar](#)). Questions on the lecture material will also be posed during lecture to provide you, as well as the professors, with immediate feedback as to your understanding of the current material.

Before lecture on Wednesday (9/23), enter your SUNetID into your PRS transmitter as described on the Chem 31A website ([PRS SUNetID Instructions](#)).

Lectures: MWF 11:00-11:50am Braun Auditorium
or 1:15-2:05pm Braun Auditorium

Sections: **In addition to a lecture section, you must sign up for a discussion section** to be held between Thursday morning and Friday morning each week. Section provides hands-on

and guided-inquiry activities to build your conceptual understanding and problem solving skills through small-group learning.

Submit section preferences on [coursework](#) by Sept. 21st by 5pm.

Outreach: Outreach workshops will be held on Monday evenings and alternate Wednesday evenings to build basic problem-solving skills through practice exercises. Guided by an advanced instructor, Outreach provides a structured environment for you to develop your skills, to go over the material at a slower pace, and to discuss questions with peers. The exercises will be posted on [CourseWork](#). Attendance is optional.

Times: Mondays and every other Wednesday - Braun Aud 6-7pm

Office Hours: Office hours are available for students who need further clarification of concepts presented in lecture, or have made solid attempts on the homework assignment or other practice problems and require further assistance understanding how to approach such problems. Students are highly encouraged to rework misunderstood problems from returned exams and then discuss them with a TA or professor during office hours.

Times

TAs:	Su 7-10 p.m.	380-380X
	Tu 7-10 p.m.	300-300
Professor:	Tu 2:15 – 3:30pm	Mudd 235 (Schwartz)
	W 2:15 – 3:30pm	Keck 125A (Dai)
	F 3:15 – 4:30pm	Stauffer II 102 (Chidsey)
	or by appointment.	

Graded Work *This course is graded on a 1000 point basis.*

- ***Course Participation (Total of 100 pts) Course participation points are accumulated through both section attendance and PRS quiz questions.***
 - ***PRS quiz questions:*** (Total of **50 pts**) There will be at least 70 in-lecture PRS quiz questions throughout the quarter, related to the assigned reading, reading problems, and lecture discussion. Each correct quiz answer will be worth 1 pt.
 - ***Section participation:*** (Total of **50 pts**) Worth 5 pts per week, minus 1 pt for every minute that you are late (cell phone time) for section. If you miss a section, but have sufficient additional PRS points, the additional points will automatically count toward the participation points for the missed section. **This applies only to the first two sections missed. If there is a report due for that section you are still responsible for turning in a complete activity report.**
- ***Activity reports (Total of 40 pts):*** There will be four short reports (1-3 pages) on activities in section. You are allowed and indeed encouraged to discuss the activities with others prior to writing your report, but the actual report must be solely of your own composition. You or a friend **should submit your report by 1:15pm (cell phone time)** on the day listed in the calendar. Each report will be graded for content and composition and will be worth 10 pts. Reports must be submitted in the labeled

receptacles **opposite Mudd 235**. The boxes will be removed at exactly **1:20 pm (cell phone time)**. Any problem sets not turned in at this time will not receive credit.

- **Problem sets** (Total of **50 pts**): There will be five handwritten problem sets. You will have 7 days to complete each one. You are allowed and encouraged to work on the problems with others, but you must compose your answers to each problem set on your own. You or a friend **should submit your problem set by 1:15pm (cell phone time)** on the day listed in the calendar. A detailed answer key will be posted immediately after the problem set is due, in order for you to make a detailed assessment of your own comprehension. Problem sets must be submitted in the labeled receptacles **opposite Mudd 235**. The boxes will be removed at exactly **1:20 pm (cell phone time)**. Any problem sets not turned in at this time will not receive credit.
- **Midterm exams** (Total of **410 pts**): There will be four midterm exams on **Wednesday evenings 7:00-8:00pm**. The first will be worth 50 pts, the second 100 pts, and the third and fourth will each be worth 130 pts. Exams may be written in pencil.
- **Final exam** (Total of **400 pts**): The final will be given **only** on **Wednesday 12/9 3:30-6:30pm**, and will be worth **400 pts**. Exams may be written in pencil.

You cannot enroll in classes or other activities that conflict with any of the exams, the lectures or your assigned section.

Requests for alternate arrangements for specific assignments must be for approved University reasons and must be requested from the Head TA at least one week in advance.

Grade: Your course grade will be determined on an absolute basis. Your grade will correspond to the following overall fractions of your total possible score:

≥95% A+	≥70% B-	≥45% D
≥90% A	≥65% C+	≥40% D-
≥85% A-	≥60% C	<40% NP
≥80% B+	≥55% C-	≥55% CR
≥75% B	≥50% D+	<55% NC

Return of Work: The most recently graded report or problem set will first be available Monday 5:55 – 7:15pm outside the Braun Auditorium (during Outreach). The most recently graded exam will first be available immediately after each lecture on Friday. Thereafter, graded work will be available for two weeks in the file boxes opposite Mudd 235. Any graded work not picked up at the end of a two week cycle will be disposed of after that exam.

Exam Regrades: Regrade requests must be submitted in person to the Head TA at one of the lectures, but no later than 2:15pm on the Wednesday following the exam. The original, unaltered exam must be accompanied by a **typed** cover letter clearly explaining why the work merited more points. Please note that when an exam is submitted for regrade, the Head TA will reevaluate the entire exam, not just the

problems requested. This can result in either a net gain or loss of points. Copies of graded exams are kept on file to monitor both grading consistency and Honor Code violations.

**Students w/
Disabilities:** Students with documented disabilities: Students who may need an academic accommodation based on the impact of a disability must initiate the request with the Student Disability Resource Center (SDRC) located within the Office of Accessible Education (OAE). SDRC staff will evaluate the request with required documentation, recommend reasonable accommodations, and prepare an *Accommodation Letter* for faculty dated in the current quarter in which the request is being made. Students should contact the SDRC as soon as possible since timely notice is needed to coordinate accommodations. The OAE is located at 563 Salvatierra Walk (phone: 723-1066).