

Course Syllabus

Chemistry 31A, Autumn 2015: Chemical Principles I: Structure & Energetics Professors Waymouth & Schwartz-Poehlmann

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 - *learning cycle*:

- Observe and experiment with various substances to gain experience with the chemical phenomena covered in that learning cycle.
- Begin to develop an understanding of the phenomena and models of the cycle by summarizing and analyzing section findings in a written report based on the first lecture and assigned reading.
- Further develop your understanding of the phenomena and models, and your skills for solving chemical problems, through assigned reading and exercises, discussion and quizzes in lecture, and small-group argument and problem solving. By the end of the week, make an initial, individual attempt on each of the problems in the problem set.
- 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.
- 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. 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.
- Complete an exam at the end of the cycle to assess your understanding and skills.

General Information**Instructors:****Professor Bob Waymouth**

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Web Sites: There are three primary websites associated with the course:

1. <https://coursework.stanford.edu> - After registering for Chem 31A on Axess you will have access to the full Chem 31A CourseWork website, where you will find course materials, course announcements, your section assignment and your scores on graded work.
2. <https://piazza.com/stanford/fall2013/chem31a/home> - All course questions should be directed to Piazza.com. This website will allow you to ask and answer questions for the course in a wiki format, so that all students can benefit from the answers!
3. <http://www.pearsonmylabandmastering.com/northamerica/> - This is the "Mastering Chemistry" website where you will complete and turn-in problem sets for the course.

Required Items**Text:** Tro, "Principles of Chemistry: A Molecular Approach" Stanford Custom Version, 2nd Edition**Problem Set:** All Chem 31A students must have a valid license for the web-based**Software** "Mastering Chemistry" program (based on our Tro textbook).****License**

**You may purchase the required access code as part of a package at the bookstore or by itself online. Further instructions on purchasing and registering a *MasteringChemistry* access code are available in a separate handout on the Chem 31A public and CourseWork websites.

i-Clicker

All Chem 31A students must have a hand-held *i-Clicker2* (available at the Stanford Bookstore) or the original *i-Clicker* to answer in-class questions drawn from assigned readings. Questions on the lecture material will also be posed during lecture to provide immediate feedback as to your understanding of the current material. **Before lecture on Monday (9/21), register your i-Clicker in Coursework.**

Honor Code Notice: Click your own personal i-clicker! It is an Honor Code violation to click i-clickers for other students. Students found using multiple i-clickers will lose their i-clicker points for the course.

Course Structure**Lectures:** Lecture attendance is compulsory. The same lecture is given in the morning and the afternoon; attend one. You must enroll for lectures via Axess.

Times: MWF 11:30am – 12:20pm in Braun Auditorium
or 1:30 - 2:20pm in Braun Auditorium

Sections:

In addition to lecture, you must enroll for one lab section on Axess by Sept. 21st. Section provides hands-on, guided-inquiry labs to build your conceptual understanding and problem solving skills with group learning. To minimize risk associated with working in a chemical lab, all students must complete the online safety training course for Chem31A (~30min). Upon completion of the online course you will print a certificate that must be turned in to your TA for entrance to your first section. Attend the section time that you sign up for on Axess. Room assignments are posted on Coursework. There are no make-up sections.

Personal Protective Equipment (PPE): Students entering the Mudd teaching laboratories must wear appropriate Personal Protective Equipment (PPE), which includes department-specific laboratory glasses and a laboratory coat, in addition to appropriate street clothes (long pants, solid shoes that cover your entire foot). The required glasses and laboratory coats must be picked up during the first week of the quarter beginning Sunday, [September 20th](#). See FAQs for pick-up times/location. **A \$50 charge** will appear on your university bill to cover the cost of the PPE. **Students must wear their glasses and lab coat during section at all times!**

Outreach: Outreach workshops help students build basic problem-solving skills through practice exercises. Guided by an advanced instructor, Outreach provides a structured environment to go over material at a slower pace and discuss questions with peers. Attendance is optional. Times: Mon 6:00–7:00pm (Braun Aud); Wed (on non-exam nights) 6:00–7:00pm (Braun Aud)

Office hours Office hours are available to further clarify lecture concepts or assist students in developing an approach towards tackling chemistry problems. Students are highly encouraged to rework misunderstood problems from returned exams and psets and discuss them during OH's.

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| TA OHs: | Sun 3-6 pm | Braun Aud | MWF 12:30-1:30 pm | OC 106/108 |
| | Tue 7-10 pm | TBA | MW 7:00-8:30 pm | Braun Aud (after Outreach) |
| | Thu 7-10 pm | TBA | | |

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| Professor OHs: | Tue 11:30 am - 1 pm | Stauffer I – 205 (Waymouth) |
| | Thu 1:15 - 3 pm | Chemistry Gazebo (Schwartz-Poehlmann) |

Assignments and Graded Work: All due dates can be found on the course calendar.

Graded Work The grading scheme for Chem 31A is designed to reward students who engage actively with the course. There are many opportunities to earn credit. This course is graded on a 1000 point basis, which includes Course Participation (max of 200 pts.), Midterm Exams (400 pts.), and Final Exam (400 pts.). Details of these three components are given below:

Course Participation: Course participation points can be accumulated through any combination of section participation, clicker questions, lab write-ups, problem sets and QUESTs *to a maximum* of 200 pts. Details of course participation components are below:

- **Lecture Participation: Clicker questions: (at least 70 pts. available)**
In-lecture clicker questions will be posed throughout the quarter, related to the assigned reading, reading problems, section, and lecture discussion. Each correct answer is worth 1 pt.
- **Section: Attendance and Safety Adherence: (max. 40 pts. available, 4 pts per week)**
Because sections are based on participation in groups and will begin with important safety information, it is critical to arrive on time. Students more than 5 minutes late, or dismissed from lab for not adhering to safety policies will forfeit their participation points for the day.
- **Lab Write-ups: (max. 30 pts. Available, 10 pts per write-up)**
There will be three short reports (1-3 pages) on activities in section. Feel free to discuss section with others, but **the actual report must be solely of your own composition**. Reports must be submitted in the labeled receptacles opposite Mudd 287, by 2:30pm on the due date.
- **Questions Exploring Scientific Thinking! ("QuESTs") (max. 20 pts. available)**
QuEST assignments allow you to develop your science writing and evaluating skills, as well as provide you an opportunity to do apply your growing chemical intuition on applications outside of the core course content. Submit your completed QuESTs using the DropBox function on CourseWork.
- **Problem sets: (10 pts. each; max. 70 pts. available)**

There are seven problem sets to be submitted through the web-based *MasteringChemistry* system by 2:30pm on the due date. 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.

Midterm exams (Total of 400 pts.): There are three midterm exams (200 pts. each) on Wednesday evenings 6:00-7:15pm, held on Oct. 7, Oct. 28, and Nov. 18. We will count your top two scores in your final grade, therefore, **if you must miss one midterm exam due to illness, family event, travel, etc., this will count as your lowest exam score and be dropped.**

Final exam (Total of 400 pts.): The final exam (closed notes) will be given only on **Wednesday December 9 from 7:00pm to 10:00pm and will be worth 400 pts.**

Exceptions: Chemistry 31A is a large, quickly moving class with nearly 500 students. Special exceptions are accommodated such as documented disabilities, University sanctioned absences and extraordinary life events. Such accommodations should be requested from the Head TA in advance (1 week) if at all possible. However, the teaching team has decided to limit incidental accommodations (e.g. late problems set, late arrival at sections or absences due to travel/illness, exam conflicts) so that we can focus on our educational mission in the course. The grading scheme is constructed with deliberate flexibility to allow for unexpected illnesses or travel. Our best advice is to be prompt in arriving at lectures, sections and exams, be prompt in delivering psets, and prepare for lab section.

Grade: Your grade is determined according to the total number of points you have accumulated for course participation (max 200 pts.), midterm exams (400 pts.) and the final (400 pts.):

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| ≥950 | A+ | ≥800 | B+ | ≥650 | C | ≥500 | D+ | <400 | NP |
| ≥900 | A | ≥750 | B | ≥600 | C+ | ≥450 | D | ≥550 | CR |
| ≥850 | A- | ≥700 | B- | ≥550 | C- | ≥400 | D- | <550 | NC |

Return of Work: The most recently graded lab write-up will be returned in your next lab section. Problem Sets are automatically graded and solutions shown on *MasteringChemistry*. All exams are returned at the end of each lecture on the Friday directly following the midterm.

Exam Regrades: Regrade requests must be submitted to the Head TA at one of the lectures but no later than 2:30pm 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. When an exam is submitted for a regrade, the entire exam will be reevaluated, with the possibility of a net gain or loss of points. Copies of graded exams are kept on file to monitor grading consistency; any changes made to an exam submitted for a regrade may be considered a violation of the honor code.

Students with Documented Disabilities Students who may need an academic accommodation based on the impact of a disability must initiate the request with the Office of Accessible Education (OAE). Professional 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 OAE (<http://studentaffairs.stanford.edu/oae>) as soon as possible since timely notice is needed to coordinate accommodations. In addition, please inform the Head TA as soon as possible, at least one week in advance of the first exam.

As part of our ongoing efforts to make this course an even better experience for students, our teaching team continually conducts research to improve our teaching methods. In this course, new teaching methods may be used and various aspects of student performance analyzed on an ongoing basis. Information about you and your performance in this course will be held strictly confidential. If you would like to opt out of participating in any new teaching methods or having your performance analyzed as part of this research, you may do so without penalty. For more information please contact Jennifer Schwartz Poehlmann (jks425@stanford.edu).