

**Chemistry 4A
General Chemistry
Fall 2015**

<i>Instructors:</i>	Professor Tanja Cuk	Professor Ke Xu
<i>Office Hours</i>	2-3PM Mon, Hildebrand Seminar Library Room E 4-5PM Wed, Hildebrand Seminar Library Room F	3-4PM Mon and Wed, 482 Stanley
<i>Email:</i>	<tanjacuk@berkeley.edu> <i>lecturing the first half of the course on atomic models, waves, and quantum mechanics</i>	<xuk@berkeley.edu> <i>lecturing the second half of the course on gases, thermodynamics, acids, and solutions</i>
<i>Class Meetings</i>	MWF 12:10-1:00 PM in 1 Pimentel Hall	
<i>Required Materials:</i>	(1) General Chemistry: Principles and Modern Applications (10th Edition) - Petrucci (2) Chem 4A Fall 2015 Lab Manual (pdf version available online) (3) Carbon(less) Copy Lab Notebook	
<i>Course Website</i>	http://bcourses.berkeley.edu	

EXPECTATIONS: In this course, the main goal is for you to develop your critical thinking skills in chemistry by learning to design an effective experiment to answer a research question. Specifically, we will be building knowledge of chemistry, but also about the scientific process in general.

bCourses: You can log on to bCourses using your Calnet ID. In addition to posting relevant course information, we will be using bCourses as an online grading tool. You will be able to check your grades online throughout the semester.

WEEKLY DISCUSSION: The GSIs will be hosting weekly discussion sessions on Tuesdays from 7:30 - 9:30PM in 120 Latimer. These sessions will focus on tying the lab material into the class material.

HOMEWORK: Homework will be assigned weekly and graded by your lab GSI. Homework is due when you get to class. The first due-date is Friday 9/4. The second set will be Monday 9/14, and following sets will be due weekly on Mondays. The week of an exam, homework will be assigned but not graded. These problems will be helpful to you in your studying but not collected. No late homework will be accepted. The lowest homework grade will be dropped before grades are calculated at the end of the semester.

EXAMS: There will be three midterm exams in this course administered during class on the following dates: September 18, October 14, and November 16. If you cannot be present to take the exams at these times, you cannot take Chem 4A. Exam questions will be taken from material covered in the course from lecture, lab, discussion, demonstrations, and applications. The final exam for this course will be cumulative and will be on Monday, Dec 14th, from 3:00-6:00 PM.

LAB: Detailed information about the laboratory portion of the course can be found through the lab syllabus or on bcourses. There will be eight experiments that span twelve weeks of the semester, with initial and final lab periods for check-in and check-out, respectively. The lab period lasts for 4 hours beginning with a brief prelab discussion facilitated by your GSI. The rest of the lab time will be devoted to performing the experiment and writing notes and observations in your lab manual. In most instances, prelab assignments are due at the beginning of lab; lab reports are due the week after you complete lab.

GRADING POLICY: The different aspects of the course will be graded as follows.

Percent of Grade

Lab	30%
Homework	15%
Midterms (3 total - 10% each)	30%
Final Exams	25%
Course Total	100%

OVERALL GRADE FOR THE COURSE:

Your overall grade for the course will be determined by the number of points you earn in the course. Typical grade ranges for the course are as follows: A (87-100); B (75-87); C (60-74); D (45-59); F (<45). Since we are grading on a straight scale, everyone has the chance to succeed and students are encouraged to help each other to maximize learning. The +/- cutoffs will not be published or released to students (not even at the end of the semester).

CHEATING AND PLAGIARISM: We expect you to follow the Berkeley Honor Code: “As a member of the UC Berkeley community, I act with honesty, integrity, and respect for others.” Incidences of cheating will be taken seriously and paperwork will be filed with the Office of Student Conduct. Resist the temptation to copy answers from solutions manuals.

LECTURE AND LAB CALENDAR:

UNIT	Monday	Wednesday	Friday	READING/ LAB
Classical Particle Motion & Electrons in Atoms		8/26—Syllabus Overview, Class Themes	8/28—Particle Nature of Electron & Energy Conservation	<u>Chapter 2</u> Check-in / Photoelectric Effect (8/31 - 9/14)
	8/31—Atomic (Planetary) Orbits & Angular Momentum			
Waves & Light		9/2—Waves, Light, & Diffraction	9/4—Photoelectric Effect & Particle Nature of Light	<u>Chapter 8 (8.1-8.5)</u> Density - Volumetric (9/14 - 9/21)
Bohr’s Atom, Spectroscopy, & Wave-Particle Duality	HOLIDAY	9/9—Bohr’s Atom and Spectroscopy	9/11—Wave-Particle Duality & the Quantum Mechanical Wave-function	
Schrodinger’s Equation & Electron Orbitals	9/14—1D Schrodinger’s Equation & Standing Waves (Particle in a Box)	9/16—3D Schrodinger’s Equation & Electron Orbitals (s, p, d)	9/18—Midterm 1	<u>Chapter 8 (8.6-8.9)</u> Absorbance & Fluorescence (9/22 - 9/28)
H-atom, Multi-electron Atoms, & Periodic Table	9/21—Quantum Mechanical H-atom	9/23—H-atom cont., Radial Distribution of Electrons	9/25—Electron Filling & Screening in Multi-electron Atoms	<u>Chapter (8.10-8.12) & Chapter 9</u> Computation (9/29 - 10/5)
	9/28—Electron Affinity, Ionization Energy, & Periodic Table Trends			
Concept of Chemical Bond		9/30—Chemical Bond & Bond Energy	10/2—Lewis Dot Structures & Octet Rule	<u>Chapter 10</u> Computation (10/6 - 10/12)
	10/5—Molecular Shapes & Dipole Moments			
Quantum Nature of Chemical Bond		10/7—Molecular Orbital Theory & Origin of Octet Rule	10/9—Molecular Orbital Theory & Hybridization of Atomic (s, p) Orbitals	<u>Chapter 11</u> NO LAB (10/13 - 10/19)
	10/12—Polyatomic Molecules & Electron Delocalization	10/14—Midterm 2		
TANJA CUK’S LECTURES END - - - KE XU’S LECTURES BEGIN				
Gases			10/16—Ideal Gas Law	<u>Chapter 6</u> Biofuels, Seeds (10/20 - 10/26)
	10/19—Microscopic descriptions of gas laws	10/21—Mixture of gases; ideal gas vs. real gas		
Thermochemistry and the first law of thermodynamics			10/23—Heat, heat capacity, and calorimetry	<u>Chapter 7</u> Biofuels, Synthesis (10/27 - 11/2)
	10/26—Work and the first law of thermodynamics	10/28—Enthalpy	10/30—Reactions and thermochemistry	
Spontaneous processes and the second law of thermodynamics	11/2—Disorder and entropy	11/4—The 2nd law and spontaneous processes	11/6—Gibbs free energy	<u>Chapters 15 & 19</u> Biofuels, Combustion (11/3 - 11/9)
	11/9—Chemical equilibrium	HOLIDAY	11/13—Free energy change and equilibrium	
Acid-base equilibria	11/16—Midterm 3	11/18—Acids and bases	11/20—Strong vs. weak acids and bases, pH	<u>Chapters 16 & 17</u> Densities - Plastic (11/10 - 11/16)
	11/23—Buffer and acid-base titration curves	HOLIDAY	HOLIDAY	
Intermolecular forces: liquids, solids, and solutions	11/30—Phase transition and phase diagrams	12/2—Solutions and mixtures; solubility	12/4—Colligative properties	Depolymerization and titration (11/17 - 12/4)

Helpful Resources:

- Weekly discussion sessions will be conducted by the GSIs on Tuesdays 7:30-9:30PM, 120 Latimer.
- The campus Student Learning Center has assistance for Chem 4A students. <http://slc.berkeley.edu>
- The Chem 4AL GSIs will staff open office hours for about 20 hours each week. Look for announcements on bCourses with specific times and locations.

We strongly recommend that you enroll in a study group run by the Student Learning Center.

Email Etiquette:

- You are expected to write as you would in any professional correspondence. Email communication should be courteous and respectful in manner and tone. Do not send emails that are curt or demanding. Be clear and concise in your communication.
- Your GSI should be your first point of contact if you have questions, comments, etc. If your GSI can't help you, he/she will contact the instructor on your behalf or you may contact the instructor directly.
- Do not expect an immediate response via email (normally, a response will be sent within one business day). If your email question is sent at the last minute it will not be possible to send you a response before an assignment is due or a test is given.

Participation:

- Keep on the topic at hand. If you have questions off the current topic, address these outside of class at office hours or by email with the GSI or instructor.
- Do not talk out of turn. Wait to be recognized before speaking and do not try to dominate a discussion with your questions or comments – give others a fair opportunity to participate.

Common Courtesy:

- Do not surf the web during class. This can be very distracting.
- Show respect for the staff and fellow classmates. Do not interrupt another who is speaking. It is okay to disagree with an idea but not okay to ridicule or make fun of another person and his/her ideas. Raised voices, derogatory language, name-calling, and intimidating behavior will not be tolerated.
- Do not disturb others by engaging in disruptive behavior. Disruption interferes with the learning environment and impairs the ability of others to focus, participate, and engage.

ACADEMIC POLICIES

We call your attention to important campus policies and guidelines concerning the academic calendar and accommodations for students in their academic programs:

- The first implements the California State Law for accommodating students whose religious creed would be violated by their taking examinations on certain holy days.
- The second sets forth the guidelines for resolving conflicts between extracurricular activities and academic requirements.
- The third outlines procedures around and expectations for the handling of absences related to illness.
- The fourth reminds instructors of their responsibilities for accommodating disabilities in the classroom.
- The fifth informs instructors of their responsibilities for accommodating pregnant and parenting students.
- The sixth provides the guidelines for permissible activities during the Reading, Review, Recitation (RRR) period before final exams.
- The seventh stipulates that no commencement ceremonies may be held before the conclusion of the final exam period in either fall or spring, with the exception of graduate professional school ceremonies with graduate students only.

Additional details, including key dates to keep in mind, are provided below.

1. ACCOMMODATION OF RELIGIOUS CREED

In compliance with California Education Code, Section 92640(a), it is the official policy of the University of California at Berkeley to permit any student to undergo a test or examination, without penalty, at a time when that activity would not violate the student's religious creed, unless administering the examination at an alternative time would impose an undue hardship that could not reasonably have been avoided. Requests to accommodate a student's religious creed by scheduling tests or examinations at alternative times should be submitted directly to the faculty member responsible for administering the examination by the second week of the semester.

Reasonable common sense, judgment and the pursuit of mutual goodwill should result in the positive resolution of scheduling conflicts. The regular campus appeals process applies if a mutually satisfactory arrangement cannot be achieved.

The link to this policy is available in the [Religious Creed](#) section of the Academic Calendar webpage.

2. CONFLICTS BETWEEN EXTRACURRICULAR ACTIVITIES AND ACADEMIC REQUIREMENTS

The Academic Senate has established Guidelines Concerning Scheduling Conflicts with Academic Requirements to address the issue of conflicts that arise between extracurricular activities and academic requirements. These policies specifically concern the schedules of student athletes, student musicians, those with out-of-town interviews, and other students with activities (e.g., classes missed as the result of religious holy days) that compete with academic obligations.

These policies were updated in Spring 2014 to include the following statement:

- **The pedagogical needs of the class are the key criteria when deciding whether a proposed accommodation is appropriate. Faculty must clearly articulate the specific pedagogical reasons that prevent accepting a proposed accommodation. Absent such a reason, the presumption should be that accommodations are to be made.**

The guidelines assign responsibilities as follows:

- It is the instructor's responsibility to give students a schedule, available on the syllabus in the first week of instruction, of all class sessions, exams, tests, project deadlines, field trips, and any other required class activities.
- It is the student's responsibility to notify the instructor(s) in writing by the second week of the semester of any potential conflict(s) and to recommend a solution, with the understanding that an earlier deadline or date of examination may be the most practicable solution.
- It is the student's responsibility to inform him/herself about material missed because of an absence, whether or not he/she has been formally excused.

The [complete guidelines](#) are available on the Academic Senate website. Additionally, a [checklist](#) to help instructors and students comply with the guidelines is available on the Center for Teaching and Learning website.

3. ABSENCES DUE TO ILLNESS

Instructors are asked to refrain from general requirements for written excuses from medical personnel for absence due to illness. Many healthy people experience a mild-to-moderate illness and recover without the need to seek medical attention. University Health Services does not have the capacity to evaluate such illnesses and provide documentation excusing student absences. However, UHS will continue to provide documentation when a student is being treated by Tang for an illness that necessitates a change in course load or an incomplete.

From time-to-time the Academic Senate has issued guidance concerning missed classes and exams due to illnesses such as influenza advising that students not attend class if they have a fever. Should a student experience repeated absences due to illness, it may be appropriate for the faculty member to ask the student to seek medical advice. The Senate guidelines advise faculty to use flexibility and good judgment in determining whether to excuse missed work, extend deadlines, or substitute an alternative assignment. Only the Committee on Courses of Instruction (COCI) can waive the final exam. However, a department chair can authorize an instructor to offer an alternative format for a final exam (e.g., paper, take-home exam) on a one-time basis (<http://academic-senate.berkeley.edu/committees/coci/toolbox#16>).

4. ACCOMMODATION FOR DISABILITY

Instructors are reminded of their responsibilities for accommodating disabilities in the classroom in the following areas:

- **Confidentiality:** Information about a student's disability is confidential, and may not be shared with other students.
- **Role of Instructor:** Course instructors play a critical role in enabling the University to meet its obligation to appropriately accommodate students with disabilities who are registered with the Disabled Students Program (DSP) and who have been issued a Letter of Accommodation.
- **Reading Assignments:**
 - In advance: Because students with print disabilities usually need assistance from the DSP Alternative Media Center, reading materials should be provided well in advance (two or more weeks) before the reading assignment due date.
 - Required or Recommended: Always indicate which course readings (including bCourse postings) are either "required" readings, or "recommended."
 - Accessible Format: Reading materials (especially bCourse postings) should be provided in an "accessible format," e.g., clearly legible, "clean" (without stray marks, highlighting, or mark-ups), and whenever possible, in a Word Document or word-searchable PDF.

For more information about accommodations for students with disabilities, please contact the Disabled Students Program at [510-642-0518](tel:510-642-0518) or email DSP Director Paul Hippolitus hippolitus@berkeley.edu. For more information about providing reading assignments in an accessible format, please contact Martha Velasquez directly at dspamc@berkeley.edu.

5. ACCOMMODATION FOR PREGNANCY AND PARENTING

In compliance with Title IX of the Education Amendments of 1972, and with the California Education Code, Section 66281.7, it is the official policy of the University of California at Berkeley to not discriminate against or exclude any person on the basis of pregnancy or related conditions, and to provide reasonable accommodations to students as appropriate. Instructors are reminded of their responsibilities for excusing medically necessary absences for pregnancy and related conditions and making reasonable accommodations in the areas of class sessions, exams, tests, project deadlines, field trips, and any other required activities. For graduate students, faculty advisors are reminded of policies regarding parental leave and the extension of normative time for academic milestones, as set out in the Guide to Graduate Policy.

Reasonable common sense, judgment and the pursuit of mutual goodwill should result in the positive resolution of conflicts. The regular campus appeals process or Title IX complaint process apply if a mutually satisfactory arrangement cannot be achieved. For more information about accommodations for student who are pregnant or parenting, please contact the [Office for the Prevention of Harassment and Discrimination](#) or (specific to graduate students) email the Graduate Division at graddean@berkeley.edu.

6. READING, REVIEW, RECITATION (RRR) WEEK

The Reading, Review, Recitation (RRR) period—which are instructional days—before final exams provides students time to prepare for exams, to work on papers and projects, and to participate in optional review sessions and meetings with instructors. For the coming semesters, please keep these dates in mind:

In Fall 2015, formal classes end on Friday, December 4, 2015. RRR Week will take place between the last day of classes (December 4) and the first day of the final exam period (Monday, December 14, 2015).

In Spring 2016, classes end on Friday, April 29, 2016. RRR week will take place between the last day of classes (April 29) and the first day of the final exam period (Monday, May 9, 2016).

Please note that the regular semester classroom will NOT be available during the RRR week unless the instructor requests it through the departmental scheduler.

Presentations of capstone projects, oral presentations, and performances are permitted, although flexibility in scheduling may be required to accommodate students' individual schedules. The introduction of new material is not permitted. Mandatory exams or quizzes and other mandatory activities are also not permitted, with some very limited exceptions (capstone presentations, for example).

Please keep in mind that final exams and papers or projects substituting for final exams may not be due before the final exam week.

Detailed, updated [guidelines on RRR week activities](#) are available on the Academic Senate web site. The Office of the Registrar has posted answers to [frequently-asked questions](#) about the academic calendar.

In addition, the Center for Teaching and Learning has prepared some [suggestions on making RRR week productive](#) for instructors and students. If you have tips or ideas you would like to have added to this page, please email teaching@berkeley.edu.

7. COMMENCEMENT CEREMONIES AND FINAL EXAMS

Campus policy stipulates that graduation ceremonies must take place after the conclusion of final examinations, with the exception of professional school ceremonies with graduate students only. For Fall 2015, final exams end at 10pm on Friday, December 18, 2015