Chemistry 4A
General Chemistry
Fall 2016

Instructors:	Professor Tanja Cuk	Professor Ke Xu
Office Hours	6-8PM Tue, Hildebrand Seminar Library Room F	1-2PM Tue and Thur, 478 Stanley
Email:	<tanjacuk@berkeley.edu> *lecturing the first half of the course on atomic models, waves, and quantum mechanics*	<xuk@berkeley.edu> *lecturing the second half of the course on gases, thermodynamics, acids, and solutions*
Class Meetings	MWF 12:10-1:00 PM in 1 Pimentel Hall	
Required Materials:	(1) General Chemistry: Principles and Modern Applications (11th Edition) - Petrucci (2) Chem 4A Fall 2016 Lab Manual (pdf version available online) (3) Carbon(less) Copy Lab Notebook	
Course Website	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 and host to the online homework system, Mastering Chemistry. You will be able to check your grades online throughout the semester.

WEEKLY DISCUSSION: The GSIs will be hosting weekly discussion sessions on Wednesdays from 8:00 - 10:00PM in 120 Latimer. These sessions will focus on working with concepts from the lecture and lab and tying the lab material into the class material when applicable.

HOMEWORK: Homework will be assigned weekly and graded by your lab GSI. Both handwritten and online based homework will be assigned. Handwritten homework is due when you get to class. The first due-date is Friday 9/2, and following sets will be due weekly on Mondays unless specified otherwise in lecture. 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 16, October 10, and November 2. 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 Friday, Dec 16th, from 11:30 AM - 2:30 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		8/24—Syllabus Overview, Class Themes	8/26—Particle Nature of Electron & Energy Conservation	Chapter 2, Oxtoby 3.3 & Appendix B2 Check-in / Photoelectric Effect (8/24 - 9/12)
	8/29—Atomic (Planetary) Orbits			
Waves & Light		8/31—Waves, Light, & Diffraction	9/2—Photoelectric Effect & Bohr's Atom	Chapter 8 (8.1-8.5) & Oxtoby 4 Check-in / Photoelectric Effect (8/24 - 9/12)
Bohr's Atom, Spectroscopy, & Wave-Particle Duality	HOLIDAY	9/7—Wave-Particle Duality & the Quantum Mechanical Wave-function	9/9—1D Schrodinger's Equation & Standing Waves	
Schrodinger's Equation & Electron Orbitals	9/12—3D Schrodinger's Equation & Electron Orbitals (s, p, d)			Chapter 8 (8.6-8.9) & Oxtoby 5.1 Density - Volumetric (9/13-9/26)
H-atom, Multi-electron Atoms, & Periodic Table		9/14—H-atom	**9/16—Midterm 1**	Chapter (8.10-8.12) & Chapter 9, Oxtoby 5.2-5.5 Density - Volumetric (9/13-9/26)
	9/19—H-atom cont., Radial Electron Distribution	9/21—Electron Filling & Screening in Multi-electron Atoms	9/23—Electron Affinity, Ionization Energy, & Periodic Table Trends	
Concept of Chemical Bond	9/26—Chemical Bond, Bond Energy, & Lewis Dot	9/28— Molecular Shapes & Dipole Moments	9/30—Molecular Orbital Theory	Chapter 10 Absorbance & Fluorescence (9/27 - 10/3)
Quantum Nature of Chemical Bond	10/3—Origin of Octet Rule & Periodic Table	10/5—Hybrid (s, p) Orbitals	10/7—Long Chain Polyatomic Molecules & Solids	Chapter 11 Computation (10/4 - 10/17)
	10/10—Midterm 2			
TANJA CUK'S LECTURES END - - - KE XU'S LECTURES BEGIN				
Gases		10/12 – Ideal gases	10/14 – Connection to the microscopic descriptions	Chapter 6 Computation (10/04 - 10/17)
	10/17 – Kinetic theory of gases	10/19 – Mixture of gases; real gas		
Thermochemistry and the first law of thermodynamics			10/21 – Heat, heat capacity, and calorimetry	Chapter 7 Biofuels (10/18 - 11/7)
	10/24 – Work and the first law of thermodynamics	10/26 – Enthalpy	10/28 – Enthalpy in reactions	
Spontaneous processes and the second law of thermodynamics	10/31 – The 2nd law and spontaneous processes	**11/02 – Midterm 3**	11/04 - Entropy	Chapters 13 & 15 Biofuels (10/18 - 11/7) Depolymerization and titration (11/8 - 12/2)
	11/07 – Gibbs free energy	11/09 – Chemical equilibrium	11/11 - HOLIDAY	
	11/14 – Le Chatelier's principle & coupled reactions			
Acid-base equilibria		11/16 - Acids and bases	11/18 - pH, salts vs. acids/bases	Chapters 16 & 17 Depolymerization and titration (11/8 - 12/2)
	11/21 - Acid-base titration & buffers	11/23 - HOLIDAY	11/25 - HOLIDAY	Chapter 12 & 14 Depolymerization and titration (11/8 - 12/2)
Intermolecular forces: liquids, solids, and solutions	11/28 - Phase transition and phase diagrams	11/30 - Solutions and mixtures	12/2 - Colligative properties	

Helpful Resources:

- Weekly discussion sessions will be conducted by the GSIs on Wednesdays from 8:00 - 10:00PM, 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

The student community at UC Berkeley has adopted the following Honor Code:

"As a member of the UC Berkeley community, I act with honesty, integrity, and respect for others." The hope and expectation is that you will adhere to this code.

Collaboration and Independence: Reviewing lecture and reading materials and studying for exams can be enjoyable and enriching things to do with fellow students. This is recommended. However, unless otherwise instructed, homework assignments are to be completed independently and materials submitted as homework should be the result of one's own independent work.

Cheating: A good lifetime strategy is always to act in such a way that no one would ever imagine that you would even consider cheating. Anyone caught cheating on a quiz or exam in this course will receive a failing grade in the course and will also be reported to the University Center for Student Conduct. In order to guarantee that you are not suspected of cheating, please keep your eyes on your own materials and do not converse with others during the quizzes and exams.

Plagiarism: To copy text or ideas from another source without appropriate reference is plagiarism and will result in a failing grade for your assignment and usually further disciplinary action. For additional information on plagiarism and how to avoid it, see, for example: http://www.lib.berkeley.edu/instruct/guides/citations.html#Plagiarism
http://gsi.berkeley.edu/teachingguide/misconduct/prevent---plag.html

Academic Integrity and Ethics: Cheating on exams and plagiarism are two common examples of dishonest, unethical behavior. Honesty and integrity are of great importance in all facets of life. They help to build a sense of self---confidence, and are key to building trust within relationships, whether personal or professional. There is no tolerance for dishonesty in the academic world, for it undermines what we are dedicated to doing – furthering knowledge for the benefit of humanity.

Your experience as a student at UC Berkeley is hopefully fueled by passion for learning and replete with fulfilling activities. And we also appreciate that being a student can be stressful. There may be times when there is temptation to engage in some kind of cheating in order to improve a grade or otherwise advance your career. This could be as blatant as having someone else sit for you in an exam, or submitting a written assignment that has been copied from another source. And it could be as subtle as glancing at a fellow student's exam when you are unsure of an answer to a question and are looking for some confirmation. One might do any of these things and potentially not get caught. However, if you cheat, no matter how much you may have learned in this class, you have failed to learn perhaps the most important lesson of all.