

San José State University
College of Science/Department of Chemistry
Chem 1A General Chemistry Sec. 40
Spring 2022

Course and Contact Information

Instructor:	Irina Slobodov
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Office Hours:	M 2:30-3:30 PM and W 12:00-1:00 PM
Class Days/Time:	MWF 1:30 PM-2:20 PM
Classroom:	SCI 142
Prerequisites:	Proficiency in high school chemistry or CHEM 010 (with a grade of "C" or better; "C-" not accepted) or instructor consent; proficiency in high school algebra and eligibility for MATH 019; Writing Enrollment Group W-I or W-II, or ENGL 1AF with a grade of CR, or ENGL 1A with a grade of C- or better.

COURSE FORMAT

This course has a lab and seminar component, which complement lectures. Lecture quizzes, lab exams and seminar quizzes will be administered online in seminars. Lecture exams will be taken in person during lecture time.

COURSE DESCRIPTION

Topics including stoichiometry, reactions, atomic structure, periodicity, bonding, states of matter, energy changes, solutions using organic and inorganic examples. Lab program complements lecture. Prerequisite: Proficiency in high school chemistry or CHEM 010 (with a grade of "C" or better; "C-" not accepted) or instructor consent; proficiency in high school algebra and eligibility for MATH 019; EPT requirement met. Misc/Lab: Lecture 3 hours/lecture 1 hour/lab 3 hours.

BS/BA CHEM PROGRAM LEARNING OUTCOMES (Covered by Chem 1A)

Chem 1A provides basic, introductory support for the following degree outcomes:

PLO #1 - Demonstrate understanding of core concepts and to effectively solve problems in inorganic chemistry.

PLO #2 - Demonstrate understanding of core concepts and to effectively solve problems in organic chemistry.

PLO #3 - Demonstrate understanding of core concepts and to effectively solve problems in analytical chemistry.

PLO #4 - Demonstrate understanding of core concepts and to effectively solve problems in physical chemistry.

- PLO #5 - Demonstrate understanding of core concepts and to effectively solve problems in biochemistry.
PLO #6 - Answer questions regarding safe practices in the laboratory and chemical safety.
PLO #7 - Demonstrate safe laboratory skills (including proper handling of materials and chemical waste) for particular laboratory experiments.

COURSE LEARNING OUTCOMES

The detailed learning outcomes can be found at the end of this syllabus.

BOOKS/SUPPLIES/COURSES

Required

- 1) Chemistry: The Central Science – Brown, LeMay and Bursten – 10th, 11th or 12th edition (Or a college level Chem. text if you feel comfortable with a different textbook.)
- 2) Hand-held scientific calculator - **Must be non-programmable** and should have log x, 10^x, ln x, e^x and x^y keys. - **You will not be allowed to use your programmable calculator or your cell phone during a lecture or lab exam, or quiz!**
- 3) **Lab Manual for Chemistry 1A** - Sold by Maple Press.

Recommended

- 1) **Academic Excellence Workshops** to help you study for Chem. 1A. These are 3 hour a week organized study sessions. We will have 4 to 12 different sessions facilitated by former 1A students. I strongly encourage you to enroll in one of these workshops. More information will be provided in lecture on how to enroll.
- 2) Lecture Booklet – Available through Maple Press if you want more practice problems, handouts, etc.
- 3) Other Chemistry texts - Most freshman chemistry books are about the same in quality and content, however you might find another author's "prose" and text layout more to your liking. You can check out additional textbooks from King Library.
- 4) Solutions manuals to textbook problems - These options are available with your book.

PREREQUISITES/COREQUISITES

The prerequisites for Chem. 1A are completion of a one year high school chemistry course; Math 19 (Pre-calculus) and English 1A eligibility. You cannot be a remedial student. You need to recall your high school chemistry. **You should not enroll in Chem. 1A if you have not had high school chemistry, if you can't remember your high school chemistry or if you had a weak high school chemistry!** You should take the Chem. 30A.

Every student who wishes to remain in the course or who wishes to add the course must be present in lab and seminar for the safety discussion and must take and pass a safety quiz. If you are waiting to get into the class please make certain you attend the safety discussion and take the safety quiz. You must pass the safety quiz with a score of 8 or better!

COURSE REQUIREMENTS AND ASSIGNMENTS

Lecture Exams and Final

Three fifty-minute exams (100 points each) will be given. Scheduled dates for the exams are attached. Plan ahead. The final exam (200 points) will be 2 hours long; it is a comprehensive multiple-choice exam. This course builds on itself so material covered on a previous lecture exam is needed in a following exam. The course lecturer reserves the right to give both in class quizzes and take home quizzes. There will be no make-ups for lecture exams. Should you miss an exam because of illness or equally compelling reasons, you should inform me of the fact as soon as possible, and hopefully before the exam is given. You can do so by emailing me. You will need to provide me with written evidence (doctors' note, police report, etc.) for your excuse. If I accept your excuse, I will use the score on the final (questions pertaining to the particular exam) as your exam score. An unexplained or unsatisfactory excuse for

missing a lab or exam will result in a grade of zero. You can arrange to take the exam a day early if you have a planned, excused absence for the exam day.

You will need to bring your photo ID card, a #2 pencil, and a non-programmable calculator. Handouts and scratch paper will be distributed.

Lecture Quizzes in Canvas

Several take-home quizzes will be given. Quizzes must be submitted on assigned due dates, or they will not be accepted. **No make-ups for missed quizzes. Do not miss the due dates!** The quizzes will be posted on your Chem 1A Lab Canvas account, and you will need to finish them online before the due dates. More information will be given in lecture meetings before the due dates.

Once you submit your quiz on canvas, you cannot access it again so make sure you print a hard copy of the quiz for your reference. The quizzes will help you prepare for the exams.

Laboratory

The total lab grade constitutes 35% of the final grade. **Failing lab (55.0% or less) or lack of attendance to lab will result in an F grade for the FULL COURSE, irrelevant of how well you are doing in lecture.** Do not miss labs!! Details regarding the lab grade will be provided in attached lab greensheet.

Your grades for all the lecture exams and canvas quizzes will be posted on canvas. You have only 9 days from the day a grade is posted to ask for a regrade. I will not do regrades after nine days have passed.

Grading Scale

At the end of the semester you will receive a single grade for the course. The following grade scale is for the full course, including lab.

above 97.0 %	A+	79.9 - 77.0 %	B-	56.9 - 54.0 %	D
96.9 - 92.0 %	A	76.9 - 72.0 %	C+	52.9 - 50.0 %	D-
91.9 - 89.0 %	A-	71.9 - 65.0 %	C	Below 50.0%	F
88.9 - 85.0 %	B+	64.9 - 61.0 %	C-		
84.9 - 80.0 %	B	60.9 - 57.0 %	D+		

Incompletes will not be given unless a strong compelling reason with proof is furnished to support the need for an incomplete. Incompletes will not be granted just because the university won't late drop you or because the low grade will disqualify you, put you on probation or increase your car insurance payment! Incompletes do not remove past scores in exams! Incompletes are only given to persons who have completed at least 80% of the course. Incompletes are removed by completing pending tasks. I do not provide special projects to make up incompletes.

PLEASE note we DO NOT provide extra credit work at the end of the semester for students who are doing poorly. You need to perform well in your tests, lab reports and quizzes.

PLEASE note that I provide bonus points throughout the tests/quizzes to push your grade up a bit just in case you feel some grading was harsh or uneven. This can amount to as much as an extra 2%. At the end of the semester I decide letter grades using the scale above without providing additional bonus.

Emergencies/evacuations

If you hear a continuously sounding alarm, or are told to evacuate by Emergency Coordinators (colored badge identities), walk quickly to the nearest stairway (end of each hall). Take your personal belongings with you as you may not be immediately allowed to return. Follow instructions of Coordinators. Be quiet so you can hear. Once outside, move away from the building. Do not return to the building unless the Police or Coordinators announce that

it is permissible. If an alarm should occur during an exam or quiz, please attempt to give your instructor the paper.

Safe and Respectful Community

We hope that the virtual classroom and laboratory will serve as an environment that will promote learning and the development of new ideas, as well as be a safe and respectful community. Behavior that interferes with the normal academic function in a classroom or lab is unacceptable. Students exhibiting this behavior will be asked to leave the class. Examples of such behavior include

- a) Persistent interruptions or using disrespectful adjectives in response to the comments of others.
- b) The use of obscene or profane language.
- c) Yelling at classmates and/or faculty.
- d) Persistent and disruptive late arrival to or early departure from class without permission.
- e) Physical threats, harassing/bullying behavior, or personal insults (even when stated in a joking manner).
- f) Use of personal electronic devices such as pagers, cell phones, PDAs in class, unless it is part of the instructional activity.

UNIVERSITY POLICIES

Per University Policy S16-9, university-wide policy information relevant to all courses, such as academic integrity, accommodations, etc. will be available on Office of Graduate and Undergraduate Programs'

[Syllabus Information web page](http://www.sjsu.edu/gup/syllabusinfo/) at <http://www.sjsu.edu/gup/syllabusinfo/>

Office Hours

Please be efficient and organized when you come to ask questions during office hours. I might have to limit the amount of time I spend with you if there are several students waiting.

On occasions I will have to cancel office hours due to medical appointments or important committee meetings. I'm sorry for the inconvenience. Please see if you can get assistance from one of the lab or seminar instructors.

Lectures/lab buddies

In a difficult and time-consuming class such as this one, it is often very useful to establish a buddy relationship with one or two students. You can lend each other notes, study together, collect handouts for each other and commiserate with each other. Seriously consider establishing such a relationship with someone in lecture and in your lab (doesn't have to be the same person).

Resources for help

- 1) Ms. Slobodov (attend office hours)
- 2) Seminar instructors (Lab and, to some degree, lecture also)
- 3) Lab instructors (Lab predominantly, although some can also provide excellent help for lecture)
- 4) Academic Excellence Workshops (Lecture) – You must be enrolled! **Please note these are not tutoring sessions.** They are organized, collaborative study times.
- 5) *COSAC* – The College of Science Advising Center is located in the second Floor of Duncan Hall, DH 213. They have peer advisors and tutors. Check their schedule.
- 6) *Peer Connections* – They have small group, individual, and drop-in tutoring for a number of undergraduate courses, consultation with mentors is available on a drop-in or by appointment basis. Visit Peer Connections website at <http://peerconnections.sjsu.edu> for more information.
- 7) *ASPIRE* – Student Services Center – Services are limited to low income, first generation college students or students with disabilities.
- 8) *Counseling Services* - Professional psychologists, social workers, and counselors are available to provide consultations on issues of student mental health, campus climate or psychological and academic issues on an individual, couple, or group basis. To schedule an appointment or learn more information, visit Counseling Services website at <http://www.sjsu.edu/counseling>.
- 9) *SI Sessions*. Free study session lead by former Chem 1A students.
- 10) *Career Center*: <http://www.sjsu.edu/careercenter/>

11) *Accessible Education Center*. If you feel that you are unable to keep up with the class even though you have all the prerequisites; if you are spending ample time studying yet you never have time to finish exams and quizzes and/or if this class, for some reason, is testing your abilities to learn, you might consider paying a visit to the Accessible Education Center, ADM 110. They might be able to test you to determine whether you have a learning disability.

Tentative Lecture Schedule

Week #	Topics	Chapter	Lab #
# 1	Review: Units, Significant Figures, Dimensional Anal., Density, Temp Atomic and Molec. Weight	1, 2.4, 3.3	#1
#2	Moles, % composition, empirical formula calculations	3.4 - 3.5	#2
#3	Nomenclature	2.5 – 2.8	#3, 4
#4	Solubility/Dissociation Rules	4.1 – 4.2	#3, 4
#5	Net Ionic Equations/Chemical Reactions	4.2- 4.3; 4.4, 20.1 – 20.2	#3, 4, 5
#6	Stoichiometry	3.6 – 3.7	#6
#7	Concentration and solutions stoichiometry	4.5 – 4.6	#6
#8	Structure of Atoms	2.1 – 2.4	#7
#9	Periodicity	7.1 – 7.6	#8
#10	Bonding	Chap. 8	#9
#11	Molecular Structure	9.1 – 9.6	#9
#12	Gases	Chap.10	#10
#13	Liquids and Solids	Chap.11, 23.5 - 23.6	#11
#14	Heat Transfer and Thermochemistry	11.4, Chap. 5	#12
#15	Organic Chemistry	2.9, 25.1 – 25.6	

Important Dates

Wed, January 26	First Chem 1A Lecture
Fri, January 28	First Chem 1A Seminar
Mon, January 31	First day of Chem 1A Labs
February 7	Last day to drop a class
February 14	Last day to add a class
Fri, February 25	Lecture Exam I
Fri, March 25	Lab Exam I
March 28 – April 1	Spring Break
Fri, April 8	Lecture Exam II
Mon, May 9	Lecture Exam III

Fri, May 13 Lab Exam II

Mon, May 16 Last lecture

Fri, May 20 (12:15 PM) Final Exam

Chem 1A Course Learning Outcomes

This is a list of very specific learning outcomes for Chem 1A lecture. The lab will also provide hands-on opportunities to develop and apply this knowledge. If a specific outcome is also partially addressed with an experiment, we have included the experiment number in parenthesis. Please note that for many of the topics in this course real world examples are used. Also, on occasion, the topics result in brief discussions of economic or societal issues.

The student will be able to:

- 1) apply significant figures rules in all calculations providing the correct number of significant figures and units (Exp 1, 2, 6, 7, 10, 11 and 12)
- 2) convert between different units using conversion factors and dimensional analysis (Exp. 1)
- 3) name elements, provide their symbols and determine the number of protons, neutrons, electrons and nuclei in elements and compounds
- 3) calculate percent composition given a molecular formula and molecular formula given the percent composition (Exp. 2)
- 4) name salts, acids, bases and covalent compounds and provide formulas for these given a molecular formula (Exp. 3)
- 5) explain the difference between solubility and dissociation in water and apply this knowledge to acids, bases and salts (Exp. 3)
- 6) identify weak and strong acids and bases and insoluble compounds using dissociation and solubility rules and develop the net ionic representation for these species using the rules (Exp. 3 and 4)
- 7) construct molecular, total and net ionic equations for double displacement reactions (Exp. 3 and 4)
- 8) identify redox reactions including identifying the oxidation, reduction, oxidation agent and reducing agent (Exp. 5)
- 9) calculate oxidation numbers and balance redox reactions (Exp. 5)
- 10) perform stoichiometry calculations for chemical and non-chemical systems whether the limiting reactant is known or unknown (Exp. 6 and 10)

- 11) calculate molarity of a solution starting with pure solute or with a concentrated solution as well as explain how to prepare a solution of a given molarity (Exp. 6)
- 12) provide brief descriptions of the accomplishments of Planck, Einstein, Thompson, Rutherford, Millikan, Rydberg, Bohr, de Broglie and Schrodinger; and how these contributed to understanding the atom
- 13) explain how a cathode ray tube works and how it assisted in understanding the electronic configuration of atoms.
- 14) convert between wavelength, energy and frequency for light and understand the relationship between absorbed light and color (Exp. 7)
- 15) calculate the energy and wavelength of a given electronic transition in hydrogen (Exp. 7)
- 16) define what each quantum number represents and how to obtain quantum numbers for any electron in an atom
- 17) analyze an atom or ion of a given element providing the full electronic configuration, the abbreviated electronic configuration, the nl^x notation, a representative diagram of the orbitals and the unpaired number of electrons; then use this information to determine the possible oxidation states of the element and the magnetic properties of the element (Exp. 8)
- 18) define electronegativity, electron affinity and ionization potential
- 19) organize a set of element or monoatomic ions in order of increasing atomic radius, ionic radius, first ionization energy and electronegativity
- 20) determine whether a bond is metallic, ionic, covalent or polar covalent
- 21) represent covalent and ionic bonding using Lewis dot structures
- 22) evaluate the molecular geometry, hybridization and polarity of a covalent molecule (Exp. 9)
- 23) evaluate the type of molecular bonding(σ or π) in a covalent molecule and identify the orbitals used for bonding
- 24) explain the properties of temperature and pressure including how these are measured and convert between different units for these properties, including the use of different liquids in the measurement of pressure (Exp. 10)
- 25) derive the relationships between pressure, volume, temperature and moles for ideal gases; perform calculations using these relations, including when they are combined with stoichiometry or percent composition problems (Exp. 10)
- 26) define and apply Dalton's Law of Partial Pressures and Graham's Law of Diffusion and Effusion to mixtures of gases (Exp. 10)

- 27) use the results from the Kinetic Molecular Theory of Gases to explain the relationship between kinetic energy, average molecular velocity, temperature, pressure, density and number of collisions when an ideal gas undergoes a change of state
- 28) describe and provide examples of the five types of intermolecular forces and be able to analyze the forces present in a substance and organize a set of compounds in order of increasing intermolecular forces (Exp. 11)
- 29) define the terms and explain the temperature dependence of surface tension, viscosity, vapor pressure, normal boiling point, capillary action; and be able to organize a set of compounds in increasing order for most of these properties (Exp. 11)
- 30) explain the concept of specific heat and apply the equation to heating or cooling of materials
- 31) perform heat transfer calculations for systems with and without phase changes (Exp 12)
- 32) calculate heats of reaction using Hess' Law or heats of formation, including combining the process with stoichiometry, and identify whether the reaction is exothermic or endothermic (Exp 12)
- 33) name unsubstituted and substituted alkanes, alkenes and alkynes given a drawing of a molecule and vice versa
- 34) identify all the isomers associated with simple aliphatic hydrocarbons and predict boiling point and vapor pressure change as a function of the number of carbons
- 35) identify and name the organic functional groups in a molecule