

**San José State University**  
**Science/Chemistry**  
**Chem 1B – General Chemistry – Lecture 2 – Spring 2023**

**Course and Contact Information**

Instructor: Dr. Karen A. Singmaster  
Office Location: DH 16  
Email: [Karen.Singmaster@sjsu.edu](mailto:Karen.Singmaster@sjsu.edu)  
Telephone: Best by email  
Office Hours: TBD I tend to get in to lecture early and leave late so a good time to ask questions.  
**Class Days/Time: MW 9:00 – 10:15**  
**Classroom: DH 135**  
Prerequisites: CHEM 001A (with a grade of "C" or better; "C-" not accepted), Math 19 ready (Do not take Chem 1B if you are still taking courses like Math 1, 10 or any of the 18s)

**Course Description**

The student is expected to gain knowledge of elementary principles and facts of chemistry and their application to problem solving. While Chem. 1A emphasized inorganic, organic and qualitative chemistry, Chemistry 1B covers mainly physical chemistry (kinetics, thermodynamics, equilibria, electrochemistry, colligative properties) in lecture and quantitative chemistry in the laboratory. This semester will require greater use of your mathematical abilities in problem solving. It also builds from your Chem 1A knowledge.

**Canvas**

Course materials such as syllabus, handouts, notes, assignment instructions, etc. can be found on [Canvas Learning Management System course login website](#). You are responsible for regularly checking with the messaging system through [MySJSU on Spartan App Portal](#) and through Canvas announcements to learn of any updates. *For help with using Canvas see [Canvas Student Resources page](#).*

**Books/Supplies/ Workshops**

**Required**

- 1) Chemistry: The Central Science – Brown, LeMay and Bursten – 10<sup>th</sup>, 11<sup>th</sup>, 12<sup>th</sup> edition (Or a college level Chem. text if you feel comfortable with a different textbook.)
- 2) **Lab Manual/Handouts for Chemistry 1B** - Sold during the first 2 weeks of school by the Chemistry Student Club (DH20- basement) - They only take cash!
- 3) Hand-held scientific calculator - **Must be non-programmable** and should have log x, 10<sup>x</sup>, ln x, e<sup>x</sup> and x<sup>y</sup> keys. - **You will not be allowed to use your programmable calculator during a lecture or lab exam, or a quiz!**

Not Required (But useful)

- 1) **Academic Excellence Workshops** to help you study for Chem. 1B. These are 3 hour a week organized study sessions. I will provide more information on how to enroll and the times.
- 2) **Preparing for Your ACS Examination in General Chemistry** – This book helps you review for the final exam which will be a standardized test taken at many universities. More details will be provided in lecture. This is also a good Gen. Chem. review for MCAT or other standardized test that contains Gen Chem. Book is sold by Chem Club in DH 20 when school starts and then they give it to me to sell.

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 MLK Library.

4) Solutions manuals to textbook problems - These options are available with your book.

5) Student Study Guide for the textbook – They have more worked out problems and many more practice problems.

6) **Suggested items to purchase for lab:** staple together 10 sheets of lined paper to keep in your drawer in lab, safety glasses and a china marker (sold at bookstore). **ASK ME WHY!**

## **Grading**

### Lecture Exams and Final

Three fifty-minute exams (100 points each), will be given approximately every fourth week. Scheduled dates for the exams are attached. The exams might include a take-home problem. Plan ahead. The final exam (200 points) will be 2 hours long. The final is a comprehensive multiple choice test that covers Chem. 1A and 1B topics. Most of the test is a standardized American Chemical Society test used at many universities. More details on this will be provided in lecture. 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 as your missing exam score. An unexplained or unsatisfactory excuse for missing a lab or exam will result in a grade of zero. You may take the exam a day early if you have a planned, excused absence for the day of the exam, IF I can accommodate the request.

### Quizzes

Several unannounced in class or take home quizzes will be given. No make-ups for missed or late quizzes.

### Laboratory

The total lab grade constitutes 40% 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 at the end of this syllabus.

### Grading Scale

At the end of the semester you will receive a single grade for the FULL Chem 1B course. The following grade scale is for the full course, including lab.

<b>above 97.0 %</b>	<b>A+</b>
<b>96.9 - 91.0 %</b>	<b>A</b>
<b>90.9 - 88.0 %</b>	<b>A-</b>
<b>87.9 - 84.0 %</b>	<b>B+</b>
<b>83.9 - 79.0 %</b>	<b>B</b>
<b>78.9 - 76.0 %</b>	<b>B-</b>
<b>75.9 - 71.0 %</b>	<b>C+</b>
<b>70.9 - 64.0 %</b>	<b>C</b>
<b>63.9 - 60.0 %</b>	<b>C-</b>
<b>59.9 - 56.0 %</b>	<b>D+</b>
<b>55.9 - 53.0 %</b>	<b>D</b>
<b>52.9 - 50.0 %</b>	<b>D-</b>
<b>Below 50.0%</b>	<b>F</b>

**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 nor do we negotiate grades.**

**Roughly the % weight of each lecture graded item is: 11% for each lecture exam, 22% for the final and 5% for the lecture/Canvas quizzes; with lab covering the remaining 40%.**

Absence from a test

We provide three lecture exams. If you are absent from ONE test for due to a **strong, compelling, documented** reason, we will use your % in the final to replace the exam score. We will not do this for more than ONE test.

### ***Attendance /Workload***

**Regular attendance to lecture, seminar and lab are required.** Lecture material will not necessarily reiterate text material. It is a serious mistake either to depend on a classmate's notes or exclusively on the textbook. It is essential to keep up with class work, homeworks and laboratories to succeed in this course. The instructor is not responsible for covering material you missed due to unexcused absences. We do not give xeroxed copies of the instructor's notes if you are absent. **Absences to lab can and will result in an F grade for the FULL course** (two unexcused absences from lab are sufficient for me to drop or fail you!!). We do have in class quizzes! Please remember that missing lecture or lab to study for another class is not an acceptable excuse. You signed up for your course load, you are now responsible for fulfilling the obligations that come with that course load.

Please remember this is a 5 unit course, it will require a great deal of your time. Seldom does a student who works and carries a full course load succeed in this class. Make arrangements now, don't wait until you are behind. **The university guidelines are three hours of study time per unit per week.**

Please email me if you are going to be absent from class for a legitimate reason. You can also email me if you are unable to reach your lab instructor to let him or her know that you will be absent from lab. To attend another lab section so as to complete work, you will need the consent of the section's lab instructor. They are not required to accept you in their lab, particularly if their lab is full! I strongly encourage you to not be absent from lab.

### ***University Policies***

Per [University Policy S16-9](#), relevant university policy concerning all courses, such as student responsibilities, academic integrity, accommodations, dropping and adding, consent for recording of class, etc. and available student services (e.g. learning assistance, counseling, and other resources) are listed on [Syllabus Information web page](#) (<https://www.sjsu.edu/curriculum/courses/syllabus-info.php>). Make sure to visit this page to review and be aware of these university policies and resources.

### ***Misconduct***

While taking exams or quizzes, the student should keep his/her eyes down on his/her own paper. No whispering or talking is allowed. You are not allowed to share a calculator or periodic table during exams or quizzes. If your calculator fails inform the instructor. They can then decide a course of action. You may not use your cell phone or PDA as a calculator; these should be stored in your backpack or on the floor beneath your seat. You may not answer the phone during a test. You cannot have headphones/earphones in your ears irrelevant of what you are listening to. All printed or written material (notebooks, textbooks, etc.) should be placed under the seat, left outside the room or placed near the lecturer's table, at the front of the room. Failure to comply will cause the instructor to pick up the exam and give a grade of F for the exam and/or course. Willful solicitation, procurement

or conveyance of exams/quizzes/unknowns will also result in failure of the course. The instructor can and will bring the person caught cheating to the attention of the university committee in charge of student misconduct.

### *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.

### *Miscellaneous*

1) You must bring the lab manual to each lab class and lecture (just in case you need to look at one of the handouts); however you do not need to bring the textbook to lecture.

2) Safety glasses must be worn at all times during the lab experiments; if they fog up, take them off outside the room!! SJSU provides you with goggles in your lab drawer but you might consider buying your own at the bookstore.

3) Keep track of your scores. Also keep your exams, quizzes, etc. At the end of the semester compare your grade sheet with the lecturer and lab instructor's grade sheets to make sure we have transcribed and adjusted your grades correctly. **You have only 9 days from the day a quiz, lab report or exam is returned to ask for a regrade of your exam or quiz. I will not do regrades after nine days have passed.** I do not return the Scantrons for exams/quizzes, so I strongly suggest you circle your choices on the exam.

4) Do not believe any sign written on the board saying the Chem. 1B class is canceled. You are expected to wait for me until 9:15 AM. If I am late, but get to class by or before that time, I will lecture.

5) Each exam in lecture will require that you sign a statement indicating that you have behaved in an honorable manner while taking the exam. This means that you have not used crib sheets, programmed equations, etc. in your calculator, requested information from a classmate, etc. The statement will also indicate that you are not aware of any other classmate cheating, etc. during the course of the exam. Although you might not be required to sign such a pledge in your lab quizzes, honorable behavior is still expected. Please be aware that you have classmates that do not tolerate cheating and will most likely inform the instructor if they observe such behavior. If you feel that you are unable to sign such a pledge, talk to me.

6) **If a fire alarm were to interrupt an exam please do the following: Leave the room via the door closest to the instructor and give the instructor your quiz or exam. Provide assistance to any disabled students. Take your books with you since there is some chance you might need to go to your next class before you are allowed in the room.** Please note that if the cause of evacuation is a bomb threat, the Dean will request that I give him and UPD a list of students absent from the exam.

7) Please remember that you must check out of the lab even if you drop the course. A \$25 charge will be billed to you if you do not check out.

8) **Any student with a disability requiring special testing conditions must show the necessary documentation from the university to the instructor within the first two weeks of class.**

9) It might be useful to keep a **second** copy of your raw data for each experiment in those papers I suggested you staple and keep in your lab drawer. That way, if you lose your lab manual or misplace the data, you have a safe copy in your drawer and you do not need to start the experiment over. All you need to copy is the raw data, you can always redo the calculations. Some labs take three periods and would require you redoing everything to get a final result.

10) You get your own two lockers in Chem. 1B. You do not share these. Once you check in you are financially responsible for any breakage or loss. More details in lab. We have been having issues with students checking out certain equipment and not returning it in a timely manner for other students to use. **There will be a late charge of \$5.00 to all Chemistry 1B students who do not return limited resource items at the end of**

**the lab period. Subsequently students will be charged \$5.00 for each additional day (not including weekends and Holidays) they fail to return these items to the Service Center.** Past the initial late fee charge of \$5.00, students will not be required to pay a late fee greater than the replacement cost of that item. Late Charges for Chemistry 1B students are for the following limited resource items: Liquid and Gas Burets, Volumetric Pipets and Bulbs, Volumetric Flasks, Conical Flasks (except 500 ml), Graduated Cylinders, Centrifuge Tubes, Funnels, Aluminum Spiral, Stopwatches, Digital Thermometers, and Volt Meters.

### ***Office hours***

TBD - Subject to change if my teaching responsibilities change after the printing of this syllabus. My office is located in the basement level of Duncan Hall (Room 16, only two of the elevators make it down to the basement!). 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. If the selected office hours do not match your schedule, set up an appointment. Please note the bonus question on the first exam will be what is the color of the piece of paper titled “**Dr. Singmaster’s Schedule Spring 2023**” that will be placed on the glass portion of the door to DH16. This paper will be placed on the door by Feb 6<sup>th</sup> so wait until then to go look. If you can’t find my office, ask me for help.

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 instructors or tutors.

### ***Resources for help***

- 1) Dr. Singmaster (Lab and Lecture)
- 2) Lab instructors (Lab predominantly, although some can also provide excellent help for lecture)
- 3) Academic Excellence Workshops (Lecture) – You must be enrolled! **Please note these are not tutoring sessions.** They are organized, collaborative study times.
- 4) CoSAC - (DH 213) Tutoring and advising center for the College of Science.
- 5) Peer Connections
- 6) ASPIRE – Student Resource Center – 10<sup>th</sup> Street Garage – Services are limited to low income, first generation college students or students with disabilities. Not sure if they have funding for tutors this year.
- 7) Counseling Services - They might have brochures or workshops on how to deal with test anxiety, if that is an issue you are having. More information at the end of the greensheet
- 8) Private tutors – Cost \$\$ . You might find ads in SAACS and in the hallways where Chemistry courses are taught (5<sup>th</sup> floor of DH, 1<sup>st</sup> floor of Sci).
- 9) 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.

### ***Rules for an exam or quiz in lecture/seminar***

- 1) You must sit in the seat you are assigned! Check the seating chart well before the exam date! It will be posted in Canvas. Find the seat in the lecture hall a few days before the exam so that you do not waste time looking for it! If you reach your seat and it is broken, please come tell me and I will find another one. No sitting on the floor in the back of the lecture hall!
- 2) No programmable calculators, PDAs or cell phones. No sharing of calculators. (This applies to lab also!)
- 3) No caps, hats, etc. unless required by a physician. Then they need to be turned around.
- 4) No head phones or other devices in ears unless they are prescribed hearing aids!
- 5) Ask for scratch paper. Do not pull it from your backpack.

6) Place backpacks under your seat so as to make sure that others don't trip trying to get out. No open books, notes, etc. on the floor at your feet!

7) No talking during an exam, even if you have handed in your exam. Wait until you leave the room.

### ***Safe and Respectful Community***

We hope that the 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.

### ***Course Learning Outcomes***

If a specific objective is also partially addressed with an experiment, then the experiment number will be in parenthesis. Please note that for many of the topics in this course real world examples are used and are analyzed by students. Also, on occasion, the topics result in brief discussions of economic or societal issues.

The student will be able to:

- 1) calculate concentration using different units and convert between different concentration units (molarity, %, ppm, g/L, etc.) (Exp. 13, 16, 19, 23)
- 2) calculate concentration changes associated with dilution (Exp. 13, 20, 22, 24)
- 3) solve stoichiometry problems using concentration or mass including balancing redox, combustion and double displacement reactions, and calculations with known or unknown limiting reagents (Exp. 16, 19, 21)
- 4) predict heats of reaction using bond energies and compare these values to heat of reaction obtained from Hess' Law or heats of formation calculations
- 5) define entropy and evaluate the sign of entropy for compounds, physical processes and chemical reactions (Exp 15)
- 6) calculate the entropy for a reaction given molar entropies for the compounds
- 7) evaluate whether a chemical reaction will occur using predictions for the sign of heat of reaction and entropy and whether altering the temperature of the reaction will affect product formation (Exp. 15)
- 8) calculate Gibbs free energy using data for heat of reaction and entropy or Gibbs free energy of formation for compounds
- 9) explain the effect concentration, temperature, presence of a catalyst and physical state have on the rate of a reaction and predict what effect changing these variables will have on the rate of reaction (Exp. 17)

- 10) derive the rate law for chemical and non chemical systems using data and then use the rate law to obtain half life and determine the amount of product formed at a given time or vice versa
- 11) apply Arrhenius' equation to chemical systems to obtain activation energy and explain the effect of temperature on chemical reaction rate at molecular level (Exp. 17)
- 12) construct a rate law using a reaction mechanism and evaluate reaction mechanisms to predict whether they are plausible based on rate law information.
- 13) define the terms catalysis and inhibitor; and compare data for reaction rates to determine whether a reaction is catalyzed or inhibited by selected compounds (Exp. 17)
- 14) construct the mathematical expression for an equilibrium constant given a chemical equilibrium and use thermodynamic or experimental data to find the value of the equilibrium constant (Exp. 18, 20, 21)
- 15) use reaction quotient to determine the direction a chemical system must shift to reach equilibrium
- 16) calculate equilibrium concentrations given initial concentrations and an equilibrium constant
- 17) use Le Chatelier's principle to explain the effect changes in temperature, pressure, volume and addition/removal of a reagent will have on a system at equilibrium; use this principle to plan how to get an equilibrium to produce more products
- 18) define and identify acids and bases based on their types (conjugate, weak, strong, Arrhenius, etc.)
- 19) calculate an equilibrium constant for a weak acid or base given pH data (Exp. 20)
- 20) analyze acid base equilibria so as to determine the type of equilibrium and utilize this information to calculate the pH of the solution
- 21) define a buffer clearly describing how it works and why buffers are important; given a buffer system calculate the pH (Exp. 20, 25)
- 22) design a buffer system given the pH region where it must serve as a buffer and the total concentration of ions needed (Exp. 25)
- 23) calculate the equilibrium constant for an insoluble salt given solubility data and vice versa, calculate the solubility of a insoluble substance when given  $K_{sp}$  (Exp. 21)
- 24) use the solubility product to determine whether a precipitate will form when solutions are mixed, including the effect pH might have on the given system
- 25) organize compounds in order of increasing strength as acids or solubility given equilibrium constants
- 26) calculate standard cell potentials for any redox reaction and combine this information with concentration data to determine the effect concentration will have on the cell potential (Exp. 22)
- 27) draw a redox cell diagram given cell notation, identify all the components, reactions occurring and, if applicable, the roles selected components play (Exp. 22)

- 28) determine cell potentials using thermodynamic data
- 29) cite the differences between chemical reactions and nuclear reactions; list the biological effects of radiation exposure
- 30) balance nuclear reactions identifying which nuclear particles are involved in the process and use the neutron to proton ratio to predict the possible types of nuclear decay an isotope could undergo
- 31) calculate mass differences and binding energies for nuclei and nuclear reactions; use this information to identify species that can undergo fusion or fission
- 32) calculate kinetic parameters for nuclear decay including applications to radioactive dating
- 33) list the colligative properties of solutions, explaining how and why each property is affected by an increase in the amount of solute (Exp. 23)
- 34) calculate the osmotic pressure of a solution.

### Lecture Schedule- Brief Version

Dates	Topic	Textbook Chapter 10th, 11th and 12th edition	Practice Problems
	Tentative lecture topics - We might go a little faster or a little slower.		Manual
1/25	Conc/Stoichio	3.6, 3.7, 4.5, 4.6, 5.6, 5.7, 13.4	15-20, 31-32, 56-57, 102
1/30 - 2/1	Thermo	3.6, 3.7, 4.5, 4.6, 5.6, 5.7, 13.4	23 - 24
2/6 - 2/8	Thermo/Kinetics	19, 14	
2/13 - 2/15	Kinetics EXAM I	14	42-44, 103-106
2/20 - 2/22	Kinetic	14	
2/27 - 3/1	General Equilibrium	15	106-110
3/6 - 3/8	Gen Equil., pH	15,16	
3/13 - 3/15	Acid Base Equil	16, 17	67-70, 111
3/20 - 3/22	Acid Base Equil EXAM II	17	
4/3 - 4/5	Solubility	17	75-78
4/10 - 4/12	Solubility, Electrochemistry	4.4, 20	
4/17 - 4/19	Electrochem	20	85-86
4/24 - 4/26	Electrochem EXAM III	20	
5/1 - 5/3	Nuclear Chem	21	
5/8 - 5/10	Nuclear Chem	21	
5/15	Colligative	13.5	

**The first problems you should try are in the lab manual at the end of the experiments or occasionally towards the back of the manual in the Practice Problem section. We will also mention problems from the text that are suitable.**



## Exam Dates

Exam I – Wed, Feb 15 – Concentration/stoichio, thermodynamics, intro kinetics

Exam II – Wed., Mar 22 – Kinetics, General Equilibrium, pH, strong acid base

Exam III – Wed., April 26 - Acid-base and solubility equilibria

Lab Exam – Fri., May 12

Final – Tues. Dec. 23<sup>rd</sup>, 9:45 AM – Electrochemistry and nuclear, with ACS exam