

## Chemistry 201 Spring 2021

Lecturer	Lab coordinator
Dr. Diane Smith CSL 412a; 619-594-4839 dksmith@sdsu.edu Office Hrs (on Zoom): M,W,F 2-2:45 pm or by appt.	Laurie Clare lclare@sdsu.edu

**Course mode of operation this semester:** Chem 201 will be run in a fully synchronous, mostly online format this semester with a few face-to-face lab sections. This means that the main lectures (M,W,F), the recitation sections (M or T), and most of the labs (W or Th) will be run live on Zoom at their scheduled times. (Zoom links for the lecture will be provided via email to students prior to the start of the semester.) A few lab sections will be run in person with special safety precautions in place. (More detail provided further down.)

**Chem 201 Blackboard (BB) Course:** Chem 201 will remain on Blackboard this semester. It will not be on Canvas. You will need to access BB to turn in all assignments, take pre-lab quizzes, midterm exams and the Final, and access your scores for the different assignments. BB will also contain much of the information you will need for the course, including old exams, quizzes, homework assignments, and lecture and lab videos.

**Text:** Chapters 12-21 of “Chemistry” by Openstax; a PDF version of this is available for download on your Chem 201 BB course. You can also order an on-demand print version at the Book Store. Finally, if you wish, the entire text can be viewed online or downloaded for free from <https://openstax.org/details/books/chemistry>.

**Other Required Materials:** Chem 201 Lab Manual (in Bookstore), Lab Notebook (any bound composition book is OK for this semester), and a non-graphing scientific calculator. Students in face-to-face labs also need an approved lab apron or coat, safety glasses or goggles, and face mask.

**Reading and Homework Assignments; Additional Study Material:** The reading and homework schedule as well as a large amount of extra study material such as old quizzes and exams will be available in the Chem 201 BB course under “course documents”. The homework problems are meant to help you prepare for quizzes and exams and will not be collected or graded.

**Grading.** Letter grades will be assigned based on your total points using the following scale as a starting point. The point distribution will be evaluated at the end of the semester, and, if appropriate, the cutoff percentages maybe lowered (but they will not be raised).

A: 100-93%; A-: 92.99-90%

B+: 89.99-87%; B:86.99%-81%; B-: 80.99-78%

C+: 77.99%-75%; C: 74.99-65%; C-: 64.99-60%

D: 59.99-50%

F: <50%

### Points Possible

3 midterm exams, multiple choice, 75 pt ea.	225
Final, multiple choice, comprehensive	150
Quizzes, best 8 out of 9, 20 pt ea.	160
3 Worksheets	30
Pipet Exercise(F2F labs only, 5 pts)/Participation (F2F labs, 5 pts; online labs, 10 pts)	10
8 Prelab Quizzes, 5 pt ea	40
7 Lab Reports	175
Safety quiz	10
<b>TOTAL POINTS</b>	<b>800</b>

**Privacy of Grades:** Scores on tests and assignments will be held in strictest confidence and will be released only to the student through BB or by being handed back directly to the student.

**Quizzes and Exams:** Quizzes and Worksheets will be given via Zoom in the Recitation sections (M/T) and will be turned in via the “Turnitin” app on Blackboard. They will be due at the end of the recitation section. The Quizzes will be based on lecture material from the previous week. A homework assignment will be given in lecture (but not collected) to help prepare you for each quiz. The Midterm exams will consist of 20 multiple choice questions. They will be given on Fridays at the regularly scheduled lecture time in Blackboard with Zoom proctoring. The Final exam will consist of 40 multiple choice questions based primarily on questions from the 3 midterm exams. The Final exam will also include a few questions based on material covered in lecture after the 3<sup>rd</sup> midterm exam.

**Special Precautions for F2F Labs this Semester.** Most lab sections will be held virtually, however a few lab sections (each at half normal capacity) are offered. In addition to the normal PPE (goggles, safety coat/apron, closed toe shoes) students will be required to wear a face mask and maintain a 6’ distance with others. Each student will be working individually with all the needed equipment at their own workstation.

**Getting Help.** Starting the third week of the semester, TA's will be available in the Chem 201 Virtual Help Room (on Zoom) to answer your questions on homework, labs, etc. The schedule for the Help Room will be posted on Blackboard. Also, do not hesitate to come to Dr. Smith's office hours (also on Zoom) with any questions regarding lecture or lab content or other concerns you may have regarding the course.

**Students with Disabilities.** If you are a student with a disability and believe you will need accommodations for this class, it is your responsibility to contact Student Ability Success Center at (619) 594-6473. To avoid any delay in the receipt of your accommodations, you should contact Student Ability Success Center as soon as possible. Please note that accommodations are not retroactive, and that we cannot provide accommodations based upon disability until we have received an accommodation letter from Student Ability Success Center. Your cooperation is appreciated.

## Learning Objectives for Chem 201

The main goal of Chem 201 is to complete the general introduction to Chemistry begun in Chem 200 and to further develop your laboratory skills, including introducing you to common laboratory instrumentation, in order to prepare you for more advanced courses in science.

By the end of this course you should be able to

- (1) Comfortably and quickly perform basic chemical “arithmetic”, that is, calculations involving unit conversion, molecular weight, grams to moles, moles to grams, molarity, dilutions, reaction stoichiometry, and so on.
- (2) Draw Lewis structures indicating the 3-dimensional shape of main group inorganic and organic chemical compounds; draw and interpret the standard shorthand method of depicting the structure of organic compounds.
- (3) Know the names, formulas, charges and structures of the common ions and the common strong acids and bases; recognize carboxylic acids and amines as weak acids and bases, respectively.
- (4) Identify and describe what is happening on the molecular level in three fundamental types of chemical reactions: (i) acid-base reactions, (ii) ion dissolution and precipitation reactions and (iii) oxidation/reduction reactions.
- (5) Describe and recognize the significance of the two major aspects to all chemical reactions:
  - (a) thermodynamics, which determines the final result or equilibrium state of a chemical reaction, and
  - (b) kinetics, which determines how long it will take to reach the equilibrium state.
    - (5a) More specifically, with regard to thermodynamics, characterize the equilibrium state using the equilibrium constant expression and equilibrium constant ( $K$ ), use knowledge of  $K$  along with other information (starting concentrations and stoichiometry) to calculate the final concentrations in a reaction, experimentally determine  $K$  by measuring the final concentrations, and, finally, calculate  $K$  using the standard thermodynamic properties of the reactants and products (if available).
    - (5b) With regard to kinetics, characterize the kinetics or speeds of chemical reactions with the rate law and rate constant ( $k$ ), perform and analyze the results of experiments to determine rate laws and  $k$ 's, recognize the significance of the rate law for the determination of the exact path or mechanism that converts reactants to products, and recognize the role catalysts can play in controlling the speed of chemical reactions.
- (6) Properly and safely perform basic laboratory tasks including weighing out chemical samples, making solutions, using pipets, doing dilutions, running titrations, calibrating and use of pH meters, calibration and use of spectrophotometers for measuring concentrations.



Week # and Dates	Lecture Monday	Recitation Mon/Tues	Lecture Wednesday	Lab Wed/Thurs	Lecture Friday
#1 Jan. 18 – Jan. 22			Introduction  <i>First day of classes</i>	No lab W or Th this week	Chap. 7 - Review of Lewis Structures
#2 Jan. 25 - Jan.29	Chap. 7 - Review of VSEPR	Ion test	Chap. 7 - Review of Formal Charge and Resonance	No lab W or Th this week	Chap. 4 - Review of Basic Reaction Stoichiometry; Limiting Reagents
#3 Feb. 1 - Feb. 5	Chap. 13 - Equilibrium	<b>Quiz 1</b>	Chap. 14 - Bronsted Acids and Bases; Conjugate Acid/Base Pairs	<b>Experiment 1 -</b> Introduction to the Spectrophotometer	Chap. 14 - pH
#4 Feb. 8 - Feb. 12	Chap. 14 - Strong Acids and Bases	<b>Quiz 2</b>	Chap. 14 - Weak Molecular Acids	<b>Experiment 3 -</b> K <sub>a</sub> and K <sub>b</sub> <i>Exp. 1 report due</i>	<b>R&amp;R Day (F, 2/12)</b> <b>No Lecture</b>
#5 Feb. 15 - Feb. 19	Chap. 14 - Weak Molecular Bases	<b>Quiz 3</b>	Chap. 14 - Identifying Acids and Bases	No lab W or Th this week	<b>Exam 1</b>

Deadline for adding or dropping classes is February 2.

Week # and Dates	Lecture Monday	Recitation Mon/Tues	Lecture Wednesday	Lab Wed/Thurs	Lecture Friday
#6 Feb. 22 – Feb 26	Chap. 14 - Ionic acids and bases	<b>Worksheet 1</b>	Chap. 14 - Buffers	<b>Experiment 2a-</b> Phosphate Analysis, Part 1 <i>Exp. 3 Report Due</i>	Chap. 14 - Buffers
#7 Mar. 1 - Mar. 5	Chap. 14 - Strong acid/base titrations	<b>Quiz 4</b>	Chap. 14 - Weak acid/base titrations	<b>Experiment 2b-</b> In-Person Labs – Locker Check-in; Pipet exercise	Chap. 15 – Ionic solubility equilibria
#8 Mar. 8 - Mar. 12	R&R Day (M, 3/8) No Lecture	No Recitation M or T this week	Chap. 15 - Factors affecting solubility; LeChatteliers Prin.	No lab W or Th this week <i>Exp. 2 report due</i>	Chap. 15 – Factors affecting solubility; Complex ions
#9 Mar. 15 - Mar. 19	Chap.16 – Enthalpy and Entropy	<b>Quiz 5</b>	Chap. 16 - $\Delta H_f^\circ$ and $S^\circ$ ; 2 <sup>nd</sup> Law of Thermodynamics	<b>Experiment 4</b> - pH titration	Chap. 16 - Free Energy
#10 Mar. 22 - Mar. 26	Chap. 16 - Free Energy and Equilibrium	<b>Quiz 6</b>	Chap. 17 - Balancing Oxidation Reduction Rxns	<b>Experiment 5</b> - Formation Constants <i>Exp. 4 report due</i>	<b>Exam 2</b>
#11 Mar. 29 – Apr. 2	Chap. 17 - Balancing Redox Rxns	R&R Day (T, 3/30) No Recitation M or T this week	Cesar Chavez Day Campus closed. No Lecture	No lab W or Th this week	Chap. 17 - Electrochemical Cells

Week # and Dates	Lecture Monday	Recitation Mon/Tues	Lecture Wednesday	Lab Wed/Thurs	Lecture Friday
#12 Apr. 5 - Apr. 9	Chap. 17 - Standard Electrode Potentials	<b>Quiz 7</b>	Chap. 17 - Using standard electrode potentials	<b>Experiment 6</b> Echem Cells <i>Exp. 5 report due</i>	Chap. 17 - Nernst Equation Concentration Cells
#13 Apr. 12 - Apr. 16	Chap. 12 - Rates of Reactions	<b>Quiz 8</b>	Chap. 12 - Rates Laws	<b>R&amp;R Day (Th, 4/15)</b> <b>No Lab W or Th this week</b>	Chap. 12 - Integrated Rate Laws
#14 Apr. 19 - Apr. 23	Chap. 12 – Arrhenius Eqn	<b>Worksheet 2</b>	Chap. 12 - Collision Theory	<b>Experiment 7</b> Kinetics <i>Exp.6 report due</i>	Chap. 12 - Transition States
#15 Apr. 26 – Apr 30	Chap. 12 - Mechanisms	<b>Quiz 9</b>	Chap. 12 - Catalysis	Locker Check Out <i>Exp.7 report due</i>	<b>Exam 3</b>
#16 May 3 - May 7	Chap. 21 - Nuclear Reactions and Radioactivity	<b>Worksheet 3</b>	Chap. 21 - Energy of Nuclear Reactions	<b>NO LAB</b> <i>Last day of classes is Thursday, May 6</i>	
#17 May 10 - May 14			<b>FINAL EXAM</b> <b>1:00 – 3:00pm</b>		

**FINAL EXAM, May 12 (Wednesday), 1:00 – 3:00 PM**