

# Chemistry 201

## Fall 2021

Lecturer:

Dr. Yong Yan

GMCS 213F; 619-594-5770

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**Office hours:** M,W 10:50-11:50 am; or by request upon Email

**Lecture:**

MWF 10:00 – 10:50 in NE60

MWF 3:00 – 3:50 in ENS 280

Lab Coordinator:

Laurie Clare

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**Text:** Chapters 12-21 of “Chemistry” by Openstax; a PDF version of this is available for download on the Chem 201 Canvas site. 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, Lab Notebook, approved lab apron, safety glasses or goggles, and a non-graphing, scientific calculator.

Lecture classes and lab classes are face-to-face.

Effective Fall 2021, students who register for face-to-face classes are expected to attend as indicated in the course schedule. Faculty teaching face-to-face courses will not be required to create a new, alternative on-line class as an accommodation for any student.

Students with medical conditions that would present a COVID-related risk in a face-to-face instructional setting should contact the Student Ability Success Center (<https://sdsu.edu/sasc>) to begin the process of getting support. Students who do not adhere to the [Covid19 Student Policies](#) or the directives of their faculty will be directed to leave the classroom and will be referred to the Center for Student Rights and Responsibilities.

Do not come to campus if you do not feel well. Remain home and monitor your symptoms and seek medical attention as needed.

### CAMPUS VACCINATION POLICY

On July 27, 2021, the California State University (CSU) system [announced](#) that students, faculty, and staff, including auxiliary employees will need to be immunized against SARS-CoV-2, the virus that causes COVID-19, with a vaccine record on file in order to access campus this fall. As outlined by the CSU, this requirement is not contingent on the full U.S. Food and Drug Administration (FDA) approval, and therefore removes some of the earlier uncertainty regarding the policy’s effective date.

SDSU will continue to operate in accordance with all federal, state, and county public health guidelines, and in compliance with CSU policies. The university will continue to prioritize the safety of students, faculty, staff, and community, while seeking to fulfill its educational mission. Visit the university’s [COVID-19 website](#) frequently, as the site is updated with current information.

### CAMPUS FACIAL COVERING POLICY

SDSU's [full facial covering policy](#) is available online and may be updated again in the fall. Please refer to the embedded URL for any fall 2021 updates, as the site will be kept current.

Through Sept. 30, the university's facial covering policy is as follows:

**Facial covering policy for those who are fully vaccinated:**

Facial coverings are *required* in the following settings:

- When in public-facing indoor settings.
- When in non-public-facing indoor settings, to include research spaces, when visitors or students are present.
- When in instructional settings, whether indoors or outdoors.
  - This includes classrooms, instructional labs, spaces being actively used in an instructional capacity, and the University Library.
  - Vaccinated instructional faculty, teaching assistants and interpreters can remove their facial coverings when teaching as long as students are masked in the classroom.

Facial coverings are *recommended* in the following settings:

- Indoors in non-public settings when gathering for meetings and other functions with others, if no members of the public or students are present.

**Facial covering policy for those who are not vaccinated:**

- Facial coverings must be worn at all times while indoors.
- Unvaccinated individuals must wear facial coverings outdoors when unable to maintain six feet of distance from others.
- Certain limited exceptions to wearing a facial covering will be granted to unvaccinated individuals, which are outlined in the full policy online.

Please refer to the [full facial coverings policy](#), housed on the university's COVID-19 site.

**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 on Canvas. In addition, this semester, homework under "Cengage" (25 points) will be required. It is designed to help you further understand the course materials and prepare for the quizzes and exam.

**Grading.** Letter grades will be assigned based on your total points using the following scale:

A: 1000-900; A-: 899-870

B+: 869-850; B: 849-800; B-: 799-780

C+: 779-750; C: 749-650; C-: 649-600

D: 599-500

F: <500

### Points

3 midterm exams, multiple choice, 100 pt ea.	300
Final, multiple choice, comprehensive	200
Quizzes (eight out of nine, 20 pt ea.)	160
4 Worksheets	40
Ion Naming Test, required to pass course	0
Pipet Exercise	5
7 Lab Reports (25 ea.)	175
2 Group Unknowns, 20 ea.	40
General Unknown	50
Homework	25
Lab points	<u>5</u>
	1000 pts

Quizzes will be given in the Recitation sections. They will be based on lecture material from the previous week. Homework assignments will be given in Cengage (but not collected) to help prepare you for each exam. The Midterm exams will consist of 20 multiple choice questions. The Final exam will consist of 40 multiple choice questions based primarily on questions from the 3 midterm exams. There will be a few questions based on material covered in lecture after the 3<sup>rd</sup> midterm exam. Both the Midterm and Final exam will be given in online exam format.

**Getting Help.** Starting the third week of the semester, TA's will be available, in GMCS 213A the Chem 201 Help Room, to answer your questions on homework, labs, etc. The schedule for the Help Room will be posted on Canvas. Some TAs will offer help through zoom. Please do not hesitate to come to Dr. Yan's office hours (on Zoom) with any questions regarding lecture. You may email our Lab coordinator Laurie (also on Zoom) regarding lab content or other concerns you may have regarding the course. In addition, Math & Stats Learning Center (MSLC) that will be open to all the Gen chem students starting in the Fall 2021. There will be undergraduate tutors available for free drop-in sessions.

**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 (SASC) using this [SASC Link](#). To avoid any delay in the receipt of your accommodations, you should contact SASC as soon as possible. Please note that accommodations are not retroactive, and that accommodations based upon disability cannot be provided until you have presented your instructor with an accommodation letter from SASC. Your cooperation is appreciated.

### **Religious Observances**

According to the University Policy File, students should notify instructors of planned absences for religious observances by the end of the second week of classes.

### **Learning Objectives for Chem 201**

The main goal of Chem 201 is to complete the general introduction to Chemistry begun in Chem 200 in order to prepare you for more advanced courses in science.

More specific goals are to

- (1) Make sure you are completely comfortable with basic chemical “arithmetic”, that is, calculations involving molecular weight, grams to moles, moles to grams, molarity, dilutions, reaction stoichiometry, and so on.
- (2) Make sure you are completely comfortable with drawing and looking at Lewis structures of chemical compounds. To start to get you thinking of molecules as 3-D objects and not just a

collection of letters and numbers in a molecular formula.

(3) Make sure you know the names, formulas, charges and structures of the common ions and the common strong acids and bases.

(4) To learn to identify and understand what is happening in three fundamental types of chemical reactions: (i) acid-base reactions, (ii) ion dissolution and precipitation reactions and (iii) oxidation/reduction reactions.

(5) To learn that there are two aspects to all chemical reactions - thermodynamics and kinetics, that thermodynamics determines the final result or equilibrium state of a chemical reaction, and that kinetics determines how long it will take to reach the equilibrium state.

(6) More specifically, with regard to thermodynamics, to learn how we characterize the equilibrium state using the equilibrium constant expression and equilibrium constant ( $K$ ), how you can use knowledge of  $K$  along with other information (starting concentrations and stoichiometry) to calculate the final concentrations in a reaction, and how you can experimentally determine values of  $K$  by measuring the final concentrations. You should also learn that ultimately the value of  $K$  is determined by the thermodynamic properties (enthalpy, entropy and free energy) of the reactants and products in a chemical reaction and how you can use knowledge of these values to calculate  $K$ 's.

(7) With regard to kinetics, you should learn how we characterize the kinetics or speeds of chemical reactions with the rate law and rate constant ( $k$ ), how we have to determine both of these quantities by experiment, and what types of experiments can be done to do this. You should also learn that the kinetics are determined by the exact path or mechanism that converts reactants to products, and how knowledge of the rate laws is very useful in determining what are likely mechanisms for a reaction.

**Policy on missing recitation and lab.** Recitation is held on Mondays and Tuesdays. If you know you will miss your recitation session, contact the lab coordinator BEFORE your session begins. This will give the coordinator opportunity to place you in another recitation. The lab coordinator will place you in another session only once. If you miss one recitation for any reason, that zero score will qualify as the lowest score and will be dropped. There are a total of 9 quizzes given, the top 8 quiz scores count toward your grade. There are no quiz make-ups

Lab sessions are held on Wednesdays and Thursdays. Your lab grade is based mainly on your formal lab report scores. No lab scores are dropped. If you know you will miss a lab session, contact the lab coordinator BEFORE your lab session begins. There are no lab make-ups.

If you are an SDSU athlete, make sure the proper notification of the season schedule gets to the lab coordinator.

Week # and Dates	Lecture Monday	Recitation Mon/Tues	Lecture Wednesday	Lab Wed/Thurs	Lecture Friday
#1 Aug. 23 – Aug. 27	Introduction	Introduction Review for ion test	Chap. 7 – Review of Lewis Structures of Organic Compds	Introduction Safety Pipet Exercise <b>Ion Test - 1<sup>st</sup> try</b>	Chap. 7 – Review of VSEPR; Drawing 3D Structures of Organic Compds
#2 Aug. 30 - Sep. 3	Chap. 7 – Review of LS's of Main Group Inor, Formal Charge and Resonance	<b>Quiz 1</b>	Chap. 4 – Review of Basic Reaction Stoichiometry; Limiting Reagents	Locker Check-in <b>Experiment 1 -</b> Introduction to the Spectrophotometer <b>Ion Test - 2<sup>nd</sup> try</b>	Chap. 13 – Equilibrium Basics
#3 Sep. 6 - Sep. 10	<b>Labor Day Holiday</b>  <b>No Class</b>	<b>No Recitation</b>	Chap. 14 – Dynamic Equilibrium; Bronsted Acids and Bases	<b>Experiment 2-</b> Phosphate Analysis  <i>Exp. 1 report due</i>	Chap. 14 – Conjugate Acid/Base Pairs, pH
#4 Sep. 13 - Sep. 17	Chap. 14 – pH of Strong Acids and Bases	<b>Quiz 2</b>	Chap. 14 – pH of Weak Acids Solutions	<b>Experiment 3- Ka and Kb</b>  <i>Exp. 2 report due</i>	Chap. 14 – pH of Weak Base Solutions
#5 Sep. 20 - Sep. 24	Chap. 14 – Naming Molecular and Ionic Acids and Bases	<b>Quiz 3</b>	Chap. 14 – pH of Ionic Acid/Base Solutions	Mg group unknown  <i>Exp. 3 report due</i>	<b>Exam 1</b>

Deadline for adding or dropping classes is September 1

Week # and Dates	Lecture Monday	Recitation Mon/Tues	Lecture Wednesday	Lab Wed/Thurs	Lecture Friday
#6 Sep 27- Oct. 1	Chap. 14 – Buffers	<b>Worksheet 1</b>	Chap. 14 – Buffers	All group unknown	Chap. 14 – Titrations of Strong Acids and Bases
#7 Oct. 4 - Oct. 8	Chap. 14 – Titrations of Weak Acids and Bases	<b>Quiz 4</b>	Chap. 15 – Ionic Solubility Equilibria	<b>Experiment 4</b> - pH titration	Chap. 15 – Factors Affecting Solubility; LeChateliers Princ.
#8 Oct. 11 - Oct. 15	Chap. 15 – Factors Affecting Solubility; Complex ions	<b>Quiz 5</b>	Chap.15 – Precipitation Reactions; Qual. Scheme	<b>Experiment 5</b> - Formation Constants <i>Exp.4 report due</i>	Chap. 16 – Entropy
#9 Oct. 18 - Oct. 22	Chap. 16 – $\Delta H^\circ$ and $\Delta S^\circ$ ; 2 <sup>nd</sup> Law of Thermodynamics	<b>Quiz 6</b>	Chap. 16 – Free Energy,	General Unknown  <i>Exp.5 report due</i>	<b>Exam 2</b>
#10 Oct. 25 – Oct. 29	Chap. 16 – $\Delta G$ and Equilibrium	<b>Worksheet 2</b>	Chap. 17 – Balancing Oxidation and Reduction Rxns	General Unknown	Chap. 17 – Electrochemical Cells

Week # and Dates	Lecture Monday	Recitation Mon/Tues	Lecture Wednesday	Lab Wed/Thurs	Lecture Friday
#11 Nov. 1- Nov. 5	Chap. 17 – Standard Electrode Potentials	<b>Quiz 7</b>	Chap. 17 – Using standard electrode potentials	General Unknown	Chap. 17 – Nernst Equation Concentration Cells
#12 Nov. 8 - Nov. 12	Chap. 12 – Rates of Reaction	<b>Quiz 8</b>	Chap. 12 – Rate Laws	<b>Veterans Day No Lab</b>	Chap. 12 – Integrated Rate Laws
#13 Nov. 15 - Nov. 19	Chap. 12 – Pseudo Order kinetics Arrhenius Eqn	<b>Worksheet 3</b>	Chap 12 – Collision Theory	<b>Experiment 6</b> Echem Cells <i>Gen Unk report due</i>	Chap. 12 – Transitions States
#14 Nov. 22 – Nov. 26	Chap. 12 – Mechanisms	<b>No recitation</b>	<b>NO CLASS!!</b>	<b>Thanksgiving Holiday NO LAB</b>	<b>Thanksgiving Holiday</b>
#15 Nov. 29 - Dec. 3	Chapter 12 – Catalysis	<b>Quiz 9</b>	Chap. 21 – Nuclear Reactions and Radioactivity	<b>Experiment 7</b> Kinetics <b>(Last Day of Lab)</b> <i>Exp.6 report due</i>	<b>Exam 3</b>
#16 Dec. 6 - Dec. 10	Chap. 21 – Kinetics of Radioactive Decay	<b>Worksheet 4</b>	Chap. 21 – Energy of Nuclear Reactions	Locker Check Out <i>Exp.7 report due</i>  <b>Last Day of Class</b>	

**FINAL EXAM for 10:00 am class- December 10 (Friday), 10:30 – 12:30 PM**

**FINAL EXAM for 3:00 pm class- December 15 (Wednesday) 1:00pm – 3:00pm**