



USC University of Southern California

Chem 105aLg: General Chemistry (4.0 Units)

Fall 2022

GENERAL INFORMATION

Class Meetings: Lecture - MWF 11-11:50am in SGM 123; Quiz Section – Th 3:30-4:50pm in SGM 124

COURSE PERSONNEL

Instructor: Professor Jessica Parr

Office Hours: Th 11 am-12:30 pm via Zoom (instructions in Blackboard, additional appointments may be requested by email)

Contact Info: parr@usc.edu (preferred contact method)

Lab Instructor: Dr. Catherine Skibo

Office Hours: See laboratory Blackboard site for times / meeting information

Contact Info: (213) 740-8265, skibo@usc.edu

Course Coordinator: Paperwork may emailed as a PDF

Electronic Office Hours: MW 1:30-3pm, emailed questions answered at this time

Contact Info: coord105@usc.edu

Teaching assistant contact information and office hours times/location can be found on the course Blackboard site.

COURSE DESCRIPTION

The purpose of CHEM 105a is to introduce the basic chemical principles that underlie all of the molecular sciences (from materials and nanoscience to medicine and the machinery of biology). It will introduce good lab practice and how to make decisions based on sound data. Topics covered include the structure and underlying principles of the periodic table, chemical bonding, reaction stoichiometry, properties of solutions and gases, and thermochemistry. After this course students will be both better prepared for continuing studies and have an understanding of molecular principles relevant to everyday life.

LEARNING OBJECTIVES

Students who successfully complete CHEM 105a will be able to:

- Explain the chemical and physical behavior of matter based on modern atomic theory, quantum mechanics, and the resulting atomic periodicity.
- Describe the formation and energetics of chemical bonds based on electrostatic forces.
- Describe and predict the structure of covalent and ionic compounds.
- Explain the properties of chemical molecules using bonding models, including hybridization and molecular orbital theory, with the understanding of their limitations.
- Describe the physical and chemical changes taking place in chemical reactions at both the particulate and macroscopic levels.
- Recognize and classify acid-base, precipitation, and oxidation-reduction reactions.
- Use balanced chemical equations to determine quantities of reactants and products.
- Explain the behavior of gas phase chemical systems at the particulate and macroscopic level using ideal gas behavior.
- Explain the First and Second Laws of Thermodynamics in relation to chemical systems.
- Describe the energetics of a chemical system using the state function enthalpy.
- Explain macroscopic properties based on intermolecular forces within the chemical system.
- Describe the structure and properties of the liquid and solid states, as well as phase changes, at the particulate and macroscopic levels.
- Explain the chemical, physical, and thermodynamic properties of solutions at the particulate and macroscopic level.
- Clearly define a problem and develop solutions for that problem including the use of central and auxiliary equations and conversion factors.
- Apply the concepts listed above to explain and interpret empirical observations, particularly in the laboratory portion of the course.
- Prepare laboratory reports that include experimental procedures, data analysis, and scientific writing.

COURSE MATERIALS

Required

Textbook: Chemistry: A Molecular Approach (5th edition) by Tro (package available in USC Bookstore includes for free the eText and Mastering Chemistry (MC not required); also available on Amazon).

Lab Manual: Chem 105a Laboratory Manual (purchasing information available once course begins)

Calculator (TI 30x IIS is the only allowed calculator in CHEM 105a & b)

100% Cotton Lab Coat and Safety Glasses or Goggles

Optional

Solutions Manual for textbook

General Chemistry Study Guide by Bryant, J. (available in bookstore or on Amazon.com)

DESCRIPTION AND ASSESSMENT OF ASSIGNMENTS

Assignments in the course include quizzes, in-class work, laboratory reports, homework, and a final project.

Quizzes

Video Quizzes and Surveys: Prior to each class you will be asked to watch a few short videos and complete a related quiz (or quizzes) on Blackboard. These videos and their quizzes will help you assess your understanding of the material. There are approximately 55 videos throughout the semester. You will earn 1 point for completing each quiz correctly, with multiple attempts allowed. Your top 50 scores will count toward your final grade. You will not earn points for submitting answers after the deadline. Please carefully note all due dates and times (found in Blackboard). There are no make-ups and no late submissions.

Quizzes: There will be four quizzes during the semester and a final quiz worth two quizzes. These will test your understanding of the material covered in the class to that point. Quizzes will be held during the first 30-45 minutes of the weekly quiz section (Thursdays at 3:30pm in SGM 124). No make-up quizzes will be given.

In-Class Work

Class sessions will be used to reinforce the pre-lecture video content and give students practice solving problems. In-class work will be assigned and collected that day. Some in-class poll questions will be answered via PollEverywhere. Poll questions are graded based on participation only and are used to gauge your understanding of the material at that moment.

Laboratory

Lab meets approximately ten times during the course. See the lab Blackboard site for information about lab requirements.

Homework

Homework Assignments are posted in Gradescope every Wednesday following the conclusion of class and are due the following Wednesday at 1 pm. Late homework assignments will be penalized one point for every 24 hour period that they are late. Your top 10 homework scores will count toward the total.

Weekly Summaries each Friday you will complete a short Google form survey. These are due by 11 am on Monday the following week.

Final Project

Details for the final project will be provided later in the semester.

Grading Breakdown

Your grade will be determined according to the following distribution:

- Module Quizzes (4) – 28%
- Video Quizzes (due before lecture) – 5%
- In-Class Work 3%
- Weekly Summaries – 1%
- Homework – 10%
- Laboratory – 29%
- Final Project – 10%
- Final Quiz – 14%

To receive a passing grade, satisfactory work must be done in both lab and the lecture portions of the course. You are encouraged to check your grades on the Chem 105a Blackboard.

Grading Scale

Course final grades will be determined using the following scale:

Grade	(%)	Total Points
A	93-100	930 - 1000
A-	90-92.9	900 - 929
B+	87-89.9	870 - 899
B	83-86.9	830 - 869
B-	80-82.9	800 - 829
C+	77-79.9	770 - 799
C	73-76.9	730 - 769
C-	70-72.9	700 - 729
D+	67-69.9	670 - 699
D	63-66.9	630 - 669
D-	60-62.9	600 - 629
F	Below 60%	Less than 600 points OR less than 145 lab points earned

We do our best to inform you on your progress in the course by assigning an approximate letter grade at the end of the third week. This is based on your performance in the course to date. Note: this advisory letter is no guarantee of your final grade. Final grades are assigned using the grading scale, above. You are encouraged to check your scores often in Blackboard.

OTHER COURSE INFORMATION

Course Notes

Lecture notes will be available on Blackboard.

Office Hours

You are strongly encouraged to attend Dr. Parrs office hours. You are also encouraged to see any TA during their office hours, not just your own.

Grading Timeline

Graded labs will be returned one week after they are submitted. All other graded work will be available for review on Blackboard within five days of the due date with the exception of the final project, which will take more time. You can view your grades at any time on the Blackboard site.

Your Rights and Responsibilities

As a member of this course, you, the student, have the right to fair and equitable grading. Every effort will be made to grade assignments consistently, quickly, and with some amount of helpful feedback. If an error in grading is made, you are allowed to ask for a regrade of the assignment, in which we will take a more careful look at your work to make sure it was graded according to the grading rubric. In courses with multiple sections, every effort will be made to communicate and coordinate across sections to avoid large difference in grading outcomes. You further have the right to ask for help in the course. Office hours are times set aside by course instructors and teaching assistants to meet with you, individually or in groups, to answer questions and help with issues throughout the semester. While attendance at office hours is optional, you are highly encouraged to attend if you have questions or concerns. Private, one-on-one appointments are also available for more confidential discussions.

Your opportunity to learn the course material is our primary goal. We agree to help you achieve mastery of the material in exchange for your agreement to make a good-faith effort to learn it. This means that all work submitted in this course must be your own. You may not use outside sources for answers to assignments (for example, pre-lab questions, lab reports, quiz questions, homework assignments, etc.). While you may collaborate with others on laboratory work and homework assignments, work must be in your own words and reflect your good-faith efforts. It is never acceptable to use outside “tutors” or others to furnish answers for you (for example, you may not consult Chegg.com, reddit, CourseHero, etc. or hire others to complete assignments for you). If you have not done so already, please familiarize yourself with the discussion of plagiarism and other forms of academic dishonesty in SCampus in Part B, Section 11, “Behavior Violating University Standards” policy.usc.edu/scampus-part-b. See additional information in SCampus and university policies on scientific misconduct, policy.usc.edu/scientific-misconduct. The posting of course materials (including Zoom recordings, quiz questions or answers, workbook content, lab reports or quizzes, or any other course-related content) to ANY internet site is strictly prohibited. Seeking outside help during weekly quizzes is a violation of the USC Honor Code. Posting of course material is a violation of US copyright law and the USC Student Conduct Code.

Students & Disability Accommodations:

USC welcomes students with disabilities into all of the University’s educational programs. The Office of Student Accessibility Services (OSAS) is responsible for the determination of appropriate accommodations for students who encounter disability-related barriers. Once a student has completed the [OSAS process](#) (registration, initial appointment, and submitted documentation) and accommodations are determined to be reasonable and appropriate, a Letter of Accommodation (LOA) will be available to generate for each course. The LOA must be given to each course instructor by the student and followed up with a discussion. This should be done as early in the semester as possible as accommodations are not retroactive. More information can be found at www.osas.usc.edu or www.osas.usc.edu. You may contact OSAS at (213) 740-0776 or via email at osasfrontdesk@usc.edu

Course Schedule: A Weekly Breakdown (Tentative – changes will be announced in lecture or on Blackboard)

Week	Date	Topic	Reading (Tro 5 th Ed)	Related Odd Problems	Videos to Watch Before Class
1	8/22	Syllabus and Class Structure	None	None	
	8/24	Measurement and Units; Subatomic Particles	1.6 2.6	1.51 – 1.05, 1.115 – 1.129 2.45, 2.47	Units of Measurement Significant Figures
	8/25				
	8/26	Nature of Light	8.2	8.35 – 8.55, 8.73, 8.77	Nature of Light
2	8/29	Bohr Model	8.3	8.57 – 8.71, 8.79 – 8.89	Wave Nature of Matter Atomic Spectra Multi-Proton Atom
	8/31	Electrons as Waves; Orbitals	8.4 – 8.6		Quantum Numbers
	9/1				
	9/2	Electron Configuration; Periodic Table	9.2 – 9.4 2.7	9.39 – 9.51, 9.83 2.63 – 2.69	Electron Configurations
3	9/5	No Classes – Labor Day			
	9/7	Periodic Trends	2.7, 9.6 – 9.9	9.53 – 9.81, 9.87 – 9.105	
	9/8	Quiz 1			
	9/9	Representing Compounds; Naming Ionic & Covalent Compounds	3.3 – 3.7	3.23 – 3.57	Bonding and Molecular Formulas Nomenclature
4	9/12	Bonding; Lewis Dot Structures	10.2, 10.3, 10.5	10.35, 10.37, 10.49 – 10.57, 10.85, 10.87	Valence Electrons Lewis Structures
	9/14	Resonance & Formal Charge; Octet Exceptions	10.6 – 10.9	10.59 – 10.77, 10.89, 10.95 – 10.103	Formal Charge Resonance Structures
	9/15				
	9/16	VSPER	11.2 – 11.4	11.31 – 11.45, 11.83	VSEPR
5	9/19	Polar Molecules	11.5	11.47 – 11.51, 11.89	Polarity
	9/21	Hybridization	11.6 – 11.7	11.53 – 11.67, 11.85 – 11.87, 11.93 – 11.97	Hybrid Orbitals
	9/22				
	9/23	Molecular Orbital Theory	11.8	11.69 – 11.81, 11.91	Molecular Orbitals Molecular Orbitals II

6	9/26	Atomic & Molar Mass	2.8 – 2.9	2.71 – 2.93, 2.101	Atomic Mass The Mole Concept Molar Mass
	9/28	Percent Composition; Elemental Analysis	3.8 – 3.10	3.59 – 3.99, 3.113 – 3.131	Percent Composition Molecular Formula from Percent Composition Data
	9/29	Quiz 2			
	9/30	Balancing Reactions; Stoichiometry	4.2 – 4.3	4.13 – 4.33, 4.59	Writing and Balancing Chemical Equations
7	10/3	Limiting Reactants; Percent Yield	4.4 – 4.5	4.35 – 4.57, 4.61 – 4.67	Limiting Reactant Theoretical and Percent Yield
	10/5	Solutions and Concentration; Electrolytes	5.2 – 5.4	5.21 – 5.31, 5.73	Solution Composition Types of Reactions and Solutions
	10/6				
	10/7	Precipitation & Solubility; Net Ionic Equations	5.5 – 5.6	5.33 – 5.49, 5.75 – 5.79	Molecular and Net Ionic Equations
8	10/10	Acids & Bases	5.7	5.51 – 5.59, 5.81 – 5.85	Acid Base Reactions
	10/12	Oxidation State; Redox Reactions	5.9	5.61 – 5.71	Oxidation-Reduction Reactions
	10/13	No Classes - Fall Recess			
	10/14	No Classes - Fall Recess			
9	10/17	Gas Pressure & Gas Laws	6.2 – 6.4	6.25 – 6.51, 6.95	Pressure and Gas Laws
	10/19	Partial Pressure; Applications of Gas Laws	6.5 – 6.7	6.53 – 6.79, 6.97 – 6.119, 6.123	Mixtures of Gases STP, Molar Volume, and Density of a Gas
	10/20	Quiz 3			
	10/21	Kinetic Molecular Theory; Real Gases	6.8 – 6.10	6.81 – 6.93, 6.125 – 6.129	Kinetic Molecular Theory Real Gases

10	10/24	Energy & Thermodynamics; Heat & Work	7.2 – 7.4	7.33 – 7.43	Energy Definitions
	10/26	Heat Capacity	7.4	7.45 – 7.69	Heat Capacity
	10/27				
	10/28	Enthalpy; Calorimetry	7.5 – 7.7	7.71 – 7.75, 7.103, 7.117	Enthalpy Calorimetry
11	10/31	Hess's Law	7.8 – 7.9	7.77 – 7.91, 7.99, 7.101, 7.105 – 7.115	Hess's Law
	11/2	Lattice Energy	10.4	10.39 – 10.47, 10.93, 10.109	Lattice Energy
	11/3				
	11/4	Bond Energy	10.10	10.79 – 10.83, 10.105, 10.111	Bond Energies and Bond Lengths
12	11/7	Intermolecular Forces	12.2 – 12.4	12.35 – 12.51, 12.83	Intermolecular Forces
	11/9	Phase Changes Vapor Pressure	12.5 – 12.7	12.53 – 12.71, 12.85 – 12.93	Phase Changes Vaporization
	11/10				
	11/11	No Classes - Veteran's Day			
13	11/14	Phase Diagrams	12.8	12.73 – 12.81, 12.95	Phase Diagrams
	11/16	Solutions & Solubility	14.2 – 14.3	14.29 – 14.49, 14.99, 14.101	Solubility
	11/17	Quiz 4			
	11/18	Gas Solubility; Concentration	14.5	14.51 – 14.67, 14.103 – 14.107	Gas Solubility Solution Composition II
14	11/21	Final Project Work	None	None	
	11/23	Thanksgiving	None	None	
	11/24	Thanksgiving	None	None	
	11/25	Thanksgiving	None	None	
15	11/28	Colligative Properties	14.6 – 14.8	14.69 – 14.97, 14.109 – 14.123	Colligative Properties
	11/30	Course Wrap-Up	None	None	
	12/1				
	12/2	Final Project Work		None	

Cumulative Quiz Thursday 12/8 – 8 am to 10 am

Statement on Academic Conduct and Support Systems

Academic Conduct:

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, “Behavior Violating University Standards” policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, policy.usc.edu/scientific-misconduct.

Support Systems:

Counseling and Mental Health - (213) 740-9355 – 24/7 on call

studenthealth.usc.edu/counseling

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call

suicidepreventionlifeline.org

Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

Relationship and Sexual Violence Prevention and Services (RSVP) - (213) 740-9355(WELL), press “0” after hours – 24/7 on call

studenthealth.usc.edu/sexual-assault

Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office of Equity and Diversity (OED)- (213) 740-5086 | Title IX – (213) 821-8298

equity.usc.edu, titleix.usc.edu

Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants. The university prohibits discrimination or harassment based on the following *protected characteristics*: race, color, national origin, ancestry, religion, sex, gender, gender identity, gender expression, sexual orientation, age, physical disability, medical condition, mental disability, marital status, pregnancy, veteran status, genetic information, and any other characteristic which may be specified in applicable laws and governmental regulations. The university also prohibits sexual assault, non-consensual sexual contact, sexual misconduct, intimate partner violence, stalking, malicious dissuasion, retaliation, and violation of interim measures.

Reporting Incidents of Bias or Harassment - (213) 740-5086 or (213) 821-8298

usc-advocate.symplicity.com/care_report

Avenue to report incidents of bias, hate crimes, and microaggressions to the Office of Equity and Diversity | Title IX for appropriate investigation, supportive measures, and response.

The Office of Student Accessibility Services (OSAS) - (213) 740-0776

osas.usc.edu

OSAS ensures equal access for students with disabilities through providing academic accommodations and auxiliary aids in accordance with federal laws and university policy.

USC Campus Support and Intervention - (213) 821-4710

campussupport.usc.edu

Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity at USC - (213) 740-2101

diversity.usc.edu

Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call

dps.usc.edu, emergency.usc.edu

Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

USC Department of Public Safety - UPC: (213) 740-6000, HSC: (323) 442-120 – 24/7 on call

dps.usc.edu

Non-emergency assistance or information.