



# USC University of Southern California

## Chem 105Lga: General Chemistry (4.0 Units)

Fall 2021

### GENERAL INFORMATION

**Class Meetings:** Lecture - MWF 9-9:50am in SGM 123; Quiz Section – Th 3:30-4:50pm in SGM 123. All class meetings are **in-person** unless otherwise announced prior to class.

### COURSE PERSONNEL

**Instructor:** Prof. Oleg Prezhdo

**Office Hours:** Tuesday 2:30pm-4:30pm via Zoom (Zoom link available on Blackboard)

**Contact Info:** prezhd@usc.edu

**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@chemmail.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 molecular sciences, from materials and nanoscience to biology and medicine. The course will introduce proper lab practices and decision making based on reliable data. Topics covered include the structure and underlying principles of the periodic table of chemical elements, models of chemical bonding, reaction stoichiometry, properties of solutions and gases, and thermochemistry. After this course students will understand molecular principles relevant to everyday life and be prepared for continuing studies.

## 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)

### 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, laboratory reports, homework, and a final project.

### Weekly Video Quizzes (7%) and Homework (10%)

**Video Quizzes:** You will be asked to watch a few short videos and complete related simple quizzes on Blackboard. These videos and their quizzes will help you prepare for in-class lectures and assess your understanding of the material. There will be about 40 videos throughout the semester. The lowest 5 video quiz scores will be dropped.

**Homework:** Similar to the Video Quizzes you will have weekly homework problem sets on Blackboard. They will be longer than the quizzes and will include more complex problems. The lowest 2 homework scores will be dropped.

Both **video quizzes** and **homework** are due on Wednesdays at 11:59pm. 5 attempts will be allowed, but you will not get any points after the deadline. There are no make-ups and no late submissions.

### Laboratory Reports (29%)

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

### Bi-weekly Quizzes (42%)

There will be six quizzes during the semester (approximately every other week) and a final quiz worth two quizzes. They will test your understanding of the material covered in the class to that point. These quizzes replace the traditional exams. Quizzes will be held during the first 30-45 minutes of the weekly quiz section (Thursdays at 3:30pm in SGM 123). No make-up quizzes will be given. Your lowest quiz grade (except the final quiz) will be dropped. *A missed quiz will be counted as a zero towards your final grade and this will be the only score dropped.*

### Final Project (12%)

At the end of the semester you will be asked to construct a poster to communicate the main ideas of a topic of interest in the course. Create a poster related to one of the course learning objectives (listed above). Your poster should clearly define and explain the topic you are covering, give concise definitions of the important terms, describe important and relevant equations (if applicable), describe any data that could be collected in the lab to illustrate the concepts, and explain why the topic is important to the world outside of the chemistry class. Your poster will be graded on accuracy, relevancy, presentation, focus, organization, references, and style. This project is worth 12% of your overall grade in the course, with 2% of this based on peer evaluation participation. Final drafts are due for peer evaluation by 5pm on Sunday, November 29. Your final product is due no later than 11:59pm on Thursday, December 9.

## Grading Breakdown

Your grade will be determined according to the following distribution:

Bi-weekly Quizzes (5 out of 6) - 30%

Video Quizzes - 7%

Homework - 10%

Laboratory - 29%

Final Project - 12%

Final Bi-weekly Quiz - 12%

To receive a passing grade, satisfactory work must be done in both lab and the lecture portions of the course.

## Grading Scale

Course final grades will be determined using the following scale:

Grade (%)	
A	93-100
A-	90-92.9
B+	87-89.9
B	83-86.9
B-	80-82.9
C+	77-79.9
C	73-76.9
C-	70-72.9
D+	67-69.9
D	63-66.9
D-	60-62.9
F	Below 60%

We do our best to inform you on your progress in the course by assigning an approximate letter grade at the middle of the semester. 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.

## ADDITIONAL COURSE INFORMATION

### Course Notes

Lecture notes will be available on the course website.

### Office Hours

You are strongly encouraged to see any TA during their office hours, not just your own. Office hours (via Zoom) for all TAs will be posted on the class website.

## **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 48 hours 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](http://policy.usc.edu/scampus-part-b). See additional information in SCampus and university policies on scientific misconduct, [policy.usc.edu/scientific-misconduct](http://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.

## **COVID-19 Policy**

Students are expected to comply with all aspects of USC’s COVID-19 policy. Failure to do so may result in removal from the class and referral to Student Judicial Affairs and Community Standards.

## Course Schedule: A Weekly Breakdown (Tentative)

	Topics	Readings	Quizzes and Assignments Due This Week
<b>Week 1</b> Aug 23-29	M: Course Intro W: Measurement and Units F: Subatomic Particles; Electromagnetic Radiation & Light; Periodic Table	1.6-1.9 2.6-2.7	
<b>Week 2</b> Aug 30- Sept 5	M: The Nature of Light; Bohr Model W: Electrons as Waves; Orbitals F: Electron Configurations	8.2-8.3 8.4-8.6 9.3-9.4	Video Quizzes and HW (9/1)
<b>Week 3</b> Sept 6 - 12	M: <i>Holiday</i> W: Periodic Trends F: Representing Compounds; Naming Ionic & Covalent Compounds	9.5-9.9 3.3-3.6; 10.2- 10.3	Video Quizzes and HW (9/8) <b>Quiz 1 (9/9)</b>
<b>Week 4</b> Sept 13- 19	M: Bonding; Lewis Dot Structures W: Electronegativity & Polarity; Resonance & Formal Charge; Octet Exceptions F: VSEPR	10.5-10.7 10.8-10.9 11.2-11.4	Video Quizzes and HW (9/15)
<b>Week 5</b> Sept 20- 26	M: Polar Molecules W: Hybridization F: Molecular Orbital Theory	11.5 11.6-11.7 11.8	Video Quizzes and HW (9/22) <b>Quiz 2 (9/23)</b>
<b>Week 6</b> Sept 27- Oct 3	M: Atomic & Molar Mass W: Percent Composition; Elemental Analysis F: Balancing Reactions; Stoichiometry	2.8-2.9 3.7-3.10 4.2-4.3	Video Quizzes and HW (9/29)
<b>Week 7</b> Oct 4-10	M: Limiting Reactants & Yield W: Solutions and Concentration; Electrolytes F: Precipitation & Solubility; Net Ionic Equations	4.4 5.2-5.3 5.4-5.6	Video Quizzes and HW (10/6) <b>Quiz 3 (10/7)</b>
<b>Week 8</b> Oct 11-17	M: Acids & Bases W: Oxidation States; Redox Reactions F: <i>Fall Break</i>	5.7 5.9	Video Quizzes and HW (10/13)
<b>Week 9</b> Oct 18-24	M: Gas Pressure & Gas Laws W: Gas Density; Partial Pressure F: Kinetic Molecular Theory; Real Gases	6.2-6.4 6.5-6.6 6.7-6.10	Video Quizzes and HW (10/20) <b>Quiz 4 (10/21)</b>
<b>Week 10</b> Oct 25-31	M: Energy & Thermodynamics; Heat & Work W: Heat Capacity F: Enthalpy; Calorimetry	7.2-7.4 7.4 7.5-7.7	Video Quizzes and HW (10/27)
<b>Week 11</b> Nov 1-7	M: Hess's Law W: Lattice Energy F: Bond Energy	7.8-7.9 10.4 10.10	Video Quizzes and HW (11/3) <b>Quiz 5 (11/4)</b>
<b>Week 12</b> Nov 8-14	M: Intermolecular Forces W: Phase Changes F: Vapor Pressure and Phase Changes	12.2-12.4 12.6-12.7 12.5	Video Quizzes and HW (11/10)
<b>Week 13</b> Nov 15-21	M: Phase Diagrams W: Solutions & Solubility F: Gas Solubility; Concentration	12.8 14.2 14.3-14.5	Video Quizzes and HW (11/17) <b>Quiz 6 (11/18)</b>

<b>Week 14</b> Nov 22-28	M: Final Project Work (No Class) <i>Thanksgiving Break</i>		
<b>Week 15</b> Nov 29- Dec 5	M: Colligative Properties; Colloids W: Course Wrap-Up F: Final Project Work (No Class)	14.6-14.7	Video Quizzes and HW (12/1) Final Project Draft Due for Peer Evaluation (11/29, 11:59pm) Peer Evaluations Due (12/2, 11:59pm)
<i>FINAL QUIZ: Thursday, Dec. 9, 8-10am</i> <i>FINAL PROJECT: Due by 11:59pm on Thursday, Dec. 9</i>			

### 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](http://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](http://policy.usc.edu/scientific-misconduct).

#### Support Systems:

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

[studenthealth.usc.edu/counseling](http://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](http://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](http://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](http://equity.usc.edu), [titleix.usc.edu](http://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.symlicity.com/care\\_report](http://usc-advocate.symlicity.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.

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

[equity.usc.edu](http://equity.usc.edu), [titleix.usc.edu](http://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.

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

[campussupport.usc.edu](http://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](http://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](http://dps.usc.edu), [emergency.usc.edu](http://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](http://dps.usc.edu)

Non-emergency assistance or information.