



# USC University of Southern California

## Chem 105bL: General Chemistry (4.0 Units) Spring 2021

**Class Meetings:** This class is offered **online**. Asynchronous videos will be posted on the course Blackboard site. Synchronous class meetings will be held via Zoom on Tuesdays and Thursdays from 12:30-1:50pm **OR** 7-8:20pm. You may attend either session, regardless of which section you are registered in.

**Instructor:** Dr. Jasmine Bryant

**Office Hours:** TTh 1:50-2:20pm & 8:20-8:50pm, additional appointments may be requested by email

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

**Lab Instructor:** Dr. Catherine Skibo

**Office Hours:** See laboratory Blackboard sites 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 105b 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 reaction kinetics, equilibrium (including applications), acids and bases, entropy and thermodynamics, electrochemistry, and selected topics in inorganic and organic chemistry. After this course students will be both better prepared for continuing studies and have an understanding of molecular principles relevant to everyday life.

### Prerequisite(s):

Chem 105A or Chem 107 or Chem 115A

### Learning Objectives

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

- Compare experimental conditions that influence reaction rates using rate laws, reaction mechanism, and collision theory.
- Connect forward and reverse reaction rates to describe a system at equilibrium.
- Determine the equilibrium constant for a chemical system and use it to qualitatively describe the relationship between amounts of reactants and products.

- Predict the equilibrium state of a chemical system in partial pressures or concentrations of reactants and products based on initial conditions.
- Predict the behavior of a chemical system at equilibrium when that system is perturbed by a change in conditions.
- Apply the concept of equilibrium to acid/base systems and use acid-equilibrium constants to predict acid strength.
- Apply the First, Second, and Third Laws of Thermodynamics in relation to chemical systems by predicting the spontaneity of various processes.
- Describe the energetics of a chemical system using the state functions enthalpy, entropy, and free energy.
- Explain the equilibrium state of a chemical system using thermodynamic principles.
- Combine the kinetic and thermodynamic properties of a chemical system to explain whether a reaction will occur on an observable time scale.
- Explain electrochemical systems and the work produced in terms of thermodynamic principles.
- Use isomerism (structural, geometric, and stereo) to explain variation in chemical and physical properties.
- Apply bonding models to the structural study of organic molecules and transition metal coordination complexes.
- Use structural properties to classify the chemical nature of ions and molecules.
- Illustrate the concepts of kinetics, thermodynamics, and equilibria using reaction coordinate diagrams.
- Illustrate examples of the particulate level as related to the concepts above.
- Assess experimental data for accuracy and precision. Evaluate sources of error in laboratory measurements.

### Required Materials

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).

Chem 105b Laboratory Manual (available for purchase online and in USC Bookstore)

Chem 105b Workbook (General Chemistry: A Guide to Success) available at <https://store2.van-griner.com/product/general-chemistry-a-guide-to-success/> (Print) or <https://store2.van-griner.com/product/redemption-code-for-general-chemistry-a-guide-to-success-ebook/> (ebook)

Scientific calculator

An internet-enabled device (smartphone, tablet, or computer) is required to attend class and submit assignments.

### Optional Materials

Solutions Manual for textbook

Calculations in Chemistry (2<sup>nd</sup> Edition) by Dahm (optional, recommended for students who desire additional practice with critical math and chemistry skills)

### Description and Assessment of Assignments

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

### Grading Breakdown

Your grade will be determined according to the following distribution:

Assignment	% of Grade
Weekly Quizzes	48%
Laboratory Reports	22%
Data Analysis Assignments	7%
Homework	4%
Video Quizzes & Surveys	4%
Final Project	15%
<b>TOTAL</b>	<b>100%</b>

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 105b website.

## 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%

*Week 9 grade:* We do our best to inform you on your progress in the course by assigning an approximate letter grade at the end of the ninth 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.

## Course Notes

Lecture notes will be available on the course website after lecture. This course uses PollEverywhere for in-class work. An internet-enabled device is required for every class meeting.

## 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 are posted on the laboratory website.

## Supplemental Instruction (SI)

The University has a Supplemental Instruction Program (<https://dornsife.usc.edu/chem105b/>) that we encourage you to use. The SI instructors hold weekly sessions going over the course material and problems. They also prepare mock exams, which you can use to test yourself before the midterms and finals. The SI leaders attend all of the lectures and are familiar with the lecture material.

## Assignment Submission Policy

Laboratory reports are due at the beginning of your lab period one week after completing the lab exercise. Pre-lab exercises are due at the beginning of the relevant lab period.

## 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.

## Live Zoom Sessions

The class will meet twice a week (TTh 12:30-1:50pm or 7-8:20pm) for synchronous work. You are expected to attend and participate in the class and group breakout sessions. Time will be spent solving problems and asking any questions you have about the material.

## Quizzes

**Concept Quizzes and Surveys:** Prior to each live Zoom session 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 50 videos throughout the semester. Most videos are followed by a short quiz. These quizzes are graded on accuracy, with multiple attempts allowed. Your highest quiz score (before the deadline) is recorded. Your five lowest scores are dropped. 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. Occasionally surveys will be posted to the Blackboard site. These surveys will be graded on participation only – there are no right or wrong answers. Points will be awarded (as stated at the beginning of each survey) for completion of each question.

**Weekly Quizzes:** There will be thirteen weekly quizzes. These will test your understanding of the material covered in the class to that point. Weekly quizzes are graded on accuracy and you have one timed attempt at the quiz. Weekly quizzes must be your own individual effort – no consultation with others or the internet are allowed. You are allowed to use your notes and/or textbook. No make-up quizzes will be given. Your lowest quiz grade will be dropped. *A missed quiz will be counted as a zero towards your final grade and this will be the only score dropped.*

## Homework

**Packet Pages:** At the end of each module you will be required to turn in electronic copies of your unit workbook pages. These pages will be graded on completion and count for 2% of your course grade.

**Summary Sheets:** Each week you will submit a summary sheet that synthesizes and integrates your understanding of the week's material in a pictorial form using flowcharts, diagrams, and graphs – rather than text. In addition to implementing deep conceptual learning, this approach allows me to keep track of your learning and misconceptions on a weekly basis. Summary sheets are due every Friday at 11:59pm, and submissions will be via Blackboard. You will also be asked to provide feedback to other students' summary sheets. These assignments will count for 2% of your course grade.

**Data Analysis Assignments:** Each unit will have a data analysis assignment where you will be asked to analyze and interpret data related to the material. You may work on these assignments with other members of the class. They will be turned in and graded for accuracy and related questions will appear on the weekly quizzes. These assignments are worth 7% of your overall grade.

It is recommended that students spend a total of 6-9 hours per week outside of class on Chem 105b-related work. Odd-numbered end-of-chapter problems should be worked each day – answers appear in the back of the textbook. These items will not be graded, but students are expected to do them.

## Laboratory

**Laboratory Orientation:** A lab orientation video will be posted to the laboratory Blackboard site. You must watch the lab orientation in order to maintain your space in the lab and thus to remain in the course.

**Quiz Period/Lab Lecture:** There will be 30-minute lab lectures posted each week. Please review them prior to your lab time. A schedule of the lab lecture topics will be posted on the Chem 105b Laboratory page on Blackboard.

**Lab Scores:** See Blackboard for lab scores (reports, prelab quizzes, etc.) and informational material.

**Laboratory Attendance:** *This is a laboratory course and attendance to all virtual lab periods is mandatory. No make-up labs can be given in this course.* Absences will be excused only for medical reasons or in the case of extreme necessity. For lab absences, email Dr. Skibo (skibo@usc.edu) as soon as possible in order to arrange a make-up lab or a make-up lab exam. You must arrive on time and prepared for lab. If you show up more than 10 minutes late, you will not be admitted to the lab session. Before leaving lab, you must turn in your exit ticket. Satisfactory completion of all labs and lab work is required to pass the class. Additional laboratory policies can be found in the lab syllabus.

**Late work:** Unless otherwise directed by Dr. Skibo, all lab reports are due at the beginning of the following week's lab. The lab calendar on the 105b lab page shows due dates for all assignments. Assignments received more than 9 days late will receive a maximum score of up to 5 points for the pre-lab assignment. The rest of the report will be evaluated as Pass or No Pass. Post-lab assignments will be submitted through the Chem 105b Lab Blackboard page. Please review your TA's feedback promptly. Regrades on laboratory reports must be requested within one week of when the lab report is graded.

## Classroom norms

Listen actively and attentively.

Be courteous. Don't interrupt or engage in private conversations while others are speaking.

Ask for clarification if you are confused.

## Final Project

At the end of the semester you will be asked to construct a poster related to a historic chemical accident or disaster. Detailed instructions will be given around Week 8. Your poster will need to clearly define and explain the event you are covering, give an overview of the chemical reaction or reactions involved, describe important and relevant thermodynamic data, including enthalpy, entropy, Gibbs free energy, along with other relevant information, describe the impact of the disaster on the surrounding area (including the societal, economic, and health impacts), and explain what may have been done (or could be done in the future) to prevent the event from happening. Your poster will be graded on accuracy, completion, visual presentation, focus, organization, references, and style. This presentation is worth 15% of your overall grade in the course, with 1.5% of this based on peer evaluation participation. Final drafts are due for peer evaluation by 5pm on Saturday, April 24. Your final product is due no later than 10am on Thursday, May 6.

## 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.

## Course evaluation

Students will submit confidential course evaluations, available online during week 15. More information will be provided in lecture.

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

	Topics	Readings	Assignments
<b>Week 1</b> Jan 18 - 24	Course Intro; Reaction Rates & Rate Laws	15.2-15.3	Assessment Survey, Syllabus Quiz, Video Quizzes, WK 1 Summary Sheet, Quiz 1
<b>Week 2</b> Jan 25 - 31	Order & Half-Life; "Pseudo" Order Reactions; Reaction coordinate Diagrams	15.4, 21.6	Video Quizzes, WK 2 Summary Sheet, Quiz 2
<b>Week 3</b> Feb. 1 - 7	Activation Energy & Catalysis; Mechanisms	15.5-15.7	Video Quizzes, WK 3 Summary Sheet, Quiz 3, Unit 1 Work
<b>Week 4</b> Feb 8 - 14	Equilibrium Expressions; ICE Tables; Solubility Equilibrium	16.2-16.8 18.5-18.6	Video Quizzes, WK 4 Summary Sheet, Quiz 4, Data 1
<b>Week 5</b> Feb 15 - 21	Le Chatelier's Principle; Common Ion Effect; Weak & Strong Acids; pH & pOH	16.9, 17.2-17.4 17.4-17.6	Video Quizzes, WK 5 Summary Sheet, Quiz 5, Unit 2 Work, Data 2
<b>Week 6</b> Feb 22 - 28	pH of Salt Solutions; Intro to Buffers pH of Buffer Solutions; Titrations	17.7-17.9 18.2-18.4	Video Quizzes, WK 6 Summary Sheet, Quiz 6, Unit 3 Work, Data 3
<b>Week 7</b> March 1 -7	Entropy, Microstates; Spontaneity; Gibbs Free Energy	19.2-19.8	Video Quizzes, WK 7 Summary Sheet, Quiz 7, Unit 4 Work, Data 4
<b>Week 8</b> Mar 8 - 14	Non-Standard Conditions; Redox Review Galvanic Cells; Cell Notation	19.9-19.10 20.2-20.4	Video Quizzes, WK 8 Summary Sheet, NO QUIZ, Unit 5 Work
<b>Week 9</b> Mar 15 - 21	Electrochemical Work; Nernst Equation; Concentration Cells; Transition Metals; Coordination Chemistry	20.5-20.9 26.2, 17.11, 26.3-26.4	Video Quizzes, WK 9 Summary Sheet, Quiz 8, Unit 6 Work, Data 5
<b>Week 10</b> Mar 22 - 28	NO CLASS TUESDAY Final Project Planning		Quiz 9, Data 6
<b>Week 11</b> Mar 29 – Apr 4	Naming Compounds; Isomers; Intro to Crystal Field Theory	22.3, 26.5	Video Quizzes, WK 11 Summary Sheet, Quiz 10
<b>Week 12</b> Apr 5 - 11	Ligand Field Theory; Spectrochemical Series; Intro. to Hydrocarbons; Naming	26.5, 22.2-22.4 22.5-22.8	Video Quizzes, WK 12 Summary Sheet, Quiz 11, Unit 7 Work, Data 6
<b>Week 13</b> Apr 12 - 18	Spectroscopy & Functional Groups; Organic Reactions	22.9-22.11	Video Quizzes, WK 13 Summary Sheet, Quiz 12
<b>Week 14</b> Apr 19 - 26	Kinetics and Acidity – From an Organic Perspective NO CLASS ON THURSDAY	17.10	Video Quizzes, Final Project Draft for Peer Evaluation, NO QUIZ
<b>Week 15</b> Apr 27 – May 2	Organic Techniques; Wrap-Up		Video Quizzes, WK 14/15 Summary Sheet, Unit 8 Work, Quiz 13, Data 8 Peer Evaluation of Projects
<b>FINAL PROJECT: DUE THURSDAY, MAY 6, 10am</b>			

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

### Support Systems:

*Counseling and Mental Health - (213) 740-9355 – 24/7 on call*  
[studenthealth.usc.edu/counseling](https://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](https://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](https://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](https://equity.usc.edu), [titleix.usc.edu](https://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](https://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 Disability Services and Programs - (213) 740-0776*  
[dsp.usc.edu](https://dsp.usc.edu)

Support and accommodations for students with disabilities. Services include assistance in providing readers/notetakers/interpreters, special accommodations for test taking needs, assistance with architectural barriers, assistive technology, and support for individual needs.

*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.