



USC University of Southern California

Chem 105b: General Chemistry (4.0 Units)

Spring 2022

GENERAL INFORMATION

Class Meetings: Lecture - MWF 9am-9:50am OR 11-11:50am in SGM 124; Quiz Section - Th 3:30-4:50pm in SGM 123 (You may attend either lecture session, regardless of enrollment). Week 1 will be offered online – see the course Blackboard site for Zoom link.

COURSE PERSONNEL

Instructor: Dr. Jasmine Bryant

Office Hours: W 3:30-4:20pm, Th 10-10:50am via Zoom (see Blackboard site; 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 site for times / meeting information

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

Course Coordinator: Paperwork may be 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 105b is to introduce the basic chemical principles that underlie all 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 understand molecular principles relevant to everyday life.

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 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.

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 105b Laboratory Manual](#) (available in USC Bookstore)

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

Optional

[General Chemistry Study Guide, Volume 2](#) by Bryant, J. (available in bookstore or on Amazon.com)

[Solutions Manual](#) for textbook

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 50 videos throughout the semester. You will have multiple attempts to complete the quiz, with your highest score before the deadline recorded. Your 5 lowest scores will be 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.

Individual Quizzes: There will be four quizzes during the semester (approximately every three weeks) and a final quiz worth two quizzes (during our Final Exam slot on Thursday, May 5, 8-10am). 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 123, see schedule for dates). No make-up quizzes or online options will be given. *A missed quiz will be counted as a zero towards your final grade.*

Group Quizzes: There will be five group quizzes during the semester, each offered the day before our individual quiz and one additional quiz in the last week of classes. Each will be during our usual class session on a Wednesday. You will work in groups of 3-4 students to solve problems together. You must be present in class for each quiz. There are no make-ups for group quizzes.

Laboratory Reports

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

Homework

There are approximately eleven homework assignments throughout the semester. You may work with other members of the class on the homework, but your submitted work must be your own. Homework assignments are due almost every Wednesday at 11:59pm, and submissions will be via Gradescope. Your lowest score will be dropped.

Final Project

At the end of the semester, you will be asked to construct a poster related to an important chemical reaction. Detailed instructions will be given around Week 8. Your poster will need to clearly define and explain the topic you are covering, give an overview of the chemical reaction and its role in society, describe important and relevant thermodynamic and / or kinetic data, including enthalpy, entropy, Gibbs free energy, reaction rates, along with other relevant information, describe the importance / relevance of the reaction, and explain any disadvantages / issues with the reaction. Your poster will be graded on accuracy, completion, visual presentation, focus, organization, references, and style. Part of your score will be based

on peer evaluation participation. Drafts of your project are due for peer evaluation by 5pm on Monday, April 25. Your final product is due no later than 11:59pm on Thursday, May 5.

Grading Breakdown

Your grade will be determined according to the following distribution:

Individual Quizzes (4) - 32%
Group Quizzes (5) - 10%
Video Quizzes (due before lecture) - 4%
Homework - 5%
Laboratory - 29%
Final Project - 10%
Final Quiz - 10%

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%

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

Class Sessions

Class sessions are used to solve problems, address misconceptions, and answer questions raised during the pre-lecture videos. Attendance is highly encouraged, and material covered in class will be assessed in quizzes. These sessions will not be recorded as live attendance is considered crucial to class discussions and problem-solving. Historically, not attending class has been correlated with lower exam and course grades.

Course Notes

Lecture notes will be available on the course website after each class session.

Office Hours

You are strongly encouraged to see any TA during their office hours, not just your own. Office hours for all TAs will be posted on the lab or 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 except for the final project, which will take more time, and the final quiz, which is not released. 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 course recordings, quiz questions or answers, workbook content, homework assignments, 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 Schedule: A Weekly Breakdown (Tentative – changes will be announced in lecture or on Blackboard)

	Topics	Readings	Assignments
Week 1 Jan 9-15	Course Intro; Reaction Rates & Rate Laws; Order & Half-Life	15.2-15.4; 21.6	Assessment Survey, Syllabus Quiz, Video Quizzes
Week 2 Jan 16-22	NO CLASS MONDAY "Pseudo" Order Reactions; Reaction coordinate Diagrams; Activation Energy & Catalysis	15.5, 15.7	Video Quizzes, HW 1
Week 3 Jan 23-29	Mechanisms; Equilibrium Expressions	15.6, 16.2-16.5	Video Quizzes, Group Quiz 1 (1/26) , HW 2, Quiz 1 (1/27)
Week 4 Jan 30-Feb 5	ICE Tables; Solubility Equilibrium; Le Châtelier's Principle; Weak & Strong Acids; pH & pOH	16.2-16.9, 18.5-18.6, 17.2-17.6	Video Quizzes, HW 3
Week 5 Feb 6-12	pH of Salt Solutions; Common Ion Effect; Intro to Buffers; pH of Buffer Solutions; Titrations	17.7-17.8, 18.2-18.4	Video Quizzes, HW 4
Week 6 Feb 13-19	Solubility & Acids; Entropy, Microstates; Spontaneity	19.2-19.8	Video Quizzes, Group Quiz 2 (2/16) , HW 5, Quiz 1 (2/17)
Week 7 Feb 20-26	NO CLASS MONDAY Gibbs Free Energy; Non-Standard Conditions	19.9-19.10	Video Quizzes
Week 8 Feb 17-Mar 5	Thermo Wrap-Up; Redox Review; Galvanic Cells; Cell Notation	20.2-20.4	Video Quizzes, HW 6
Week 9 Mar 6-12	Electrochemical Work; Concentration Cells NO CLASS FRIDAY – Work on your final project	20.5-20.9	Video Quizzes, HW 7
Mar 13-19	SPRING BREAK		
Week 10 Mar 20-26	Transition Metals; Coordination Chemistry; Naming Compounds	26.2-26.3, 17.11	Video Quizzes, Group Quiz 3 (3/23) , Quiz 3 (3/24)
Week 11 Mar 27-April 2	Isomers; Optical Isomers; Intro to Crystal Field Theory; Ligand Field Theory; Spectrochemical Series	26.4, 22.3, 26.5	Video Quizzes, HW 8
Week 12 April 3-9	Intro. to Hydrocarbons; Organic Naming; Functional Groups	22.2-22.8	Video Quizzes, HW 9
Week 13 April 10-16	Spectroscopy; Organic Reactions	22.9-22.11	Video Quizzes, Group Quiz 4 (4/13) , HW 10, Quiz 4 (3/14)

Week 14 April 17-23	NO CLASS ON MONDAY – work on your final project Kinetics and Acidity – From an Organic Perspective; Wrap-Up	17.10	Video Quizzes; Final Project Work
Week 15 April 24-30	NO CLASS ON MONDAY – work on your final project Wednesday: Group Quiz 4 NO CLASS ON FRIDAY – work on your final project		Final Project Draft Due, Group Quiz 5 (4/27) , HW 11 Peer Evaluation of Projects
<i>FINAL QUIZ: Thursday, May 5, 8-10am</i> <i>FINAL PROJECT: Due by 11:59pm on Thursday, May 5</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. 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 - (213) 740-0776

osas.usc.edu

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. You may contact OSAS at (213) 740-0776 or via email at osasfrontdesk@usc.edu

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.