

## CHEMISTRY 115A - ADVANCED GENERAL CHEMISTRY

### FALL 2023 SYLLABUS

**Class Meetings:** Lecture - MWF 9:00-9:50am in **SGM 101**;  
Quiz Section – Th 3:30-4:50 pm in **SGM 101** or by zoom, as notified.

#### COURSE PERSONNEL

**Lecture:** Prof. Hanna Reisler; [reisler@usc.edu](mailto:reisler@usc.edu)

**Office Hours:** Wed. 11:00-12:00; Fri. 2-3 pm; **SSC 622** (additional appointments requested by email).

**Lab Instructor:** Prof. Jessica Parr; [parr@usc.edu](mailto:parr@usc.edu)

**Office Hours:** Mon. noon-1:30 pm; Tues. 9:30-10:30 am; SGM 445 (additional appointments may be requested by email)

**SI Leader:** Andrew Vu

**Class Meetings:** This class is offered with in-person instruction. Discussion section is on Thurs: 3:30 -4:50 pm with three midterm exam (60 minutes each) conducted in class (SGM 101). Some discussions and student presentations will be conducted by zoom. Additional information will be posted on the course Blackboard website.

**Teaching assistants contact information and office hour times will be posted on the course Blackboard site.**

#### Course Description

CHEM 115a is an advanced class that aims to use basic chemical and physical principles that underlie molecular science to solve scientific problems relevant to chemistry, biochemistry, materials science, nanoscience, medicine, biology, and atmospheric and environmental chemistry. The course teaches how physical laws, theories, and models are used in modern scientific research, including addressing societal issues that affect the environment and climate change, and the development of alternative energy sources and novel materials. Topics covered this semester include atomic theory, bonding models, stoichiometry in gas and solution phases, gas laws, thermochemistry, intermolecular interactions, and more. In the laboratory, students learn how to design experiments, collect data, analyze results, and produce written reports, gaining experience in lab procedures and scientific communication in a way that prepares them for undergraduate research. After completing this course students will be prepared for their continuing studies and acquire facility in solving complex problems that require analytical skills.

#### Learning Objectives

Students who successfully complete CHEM 115a will be able to:

- Explain the chemical and physical behavior of matter based on modern atomic theory, quantum mechanics, periodic properties of atoms, and covalent and ionic bonding theories.
- Describe the electronic structure of atoms and the forces that act within atoms and between them.

- Describe the formation and energetics of chemical bonds based on electrostatic forces and quantum theories, including intermolecular interactions.
- Explain the properties chemical bonding based on Lewis structures, hybridization and molecular orbital theories, with the understanding of their power and limitations, and calculate binding strength.
- Classify and balance 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 by using ideal gas models.
- Describe the energetics of chemical systems using state functions and enthalpies of reaction.
- Clearly define quantitative problems and develop solution strategies.
- Apply the concepts listed above to explain and interpret empirical observations in the laboratory and undergraduate research.
- Prepare laboratory reports that include experimental procedures, data analysis, and scientific writing used in describing research results.
- Apply basic concepts to the understanding of current research topics in chemistry and biochemistry.
- Prepare written assignments on scientific topics and communicate the main ideas both verbally and in writing.

#### Required for class:

1. *Principles of Modern Chemistry*, 8th Edition, by Oxtoby, Gillis and Butler
2. *Student Solutions Manual* for the 8<sup>th</sup> edition of the textbook, by the same authors.
3. "Chem 115 Laboratory Packet" by USC Advanced General Chemistry Program.

#### Coverage

**Chapters 1-3, 11, 9, 12, 4-6, and 10** will be covered this semester in this order. The order has been determined to coincide roughly with Chem 105a. The textbook will be supplemented with material relevant to current research topics in chemistry. **Attendance at all lectures and discussion sessions is mandatory.** Attendance will be checked online and verified. Additional required materials (text, videos, slides, quizzes, etc.) will be posted in Blackboard.

#### Discussion sections and midterm exams

Discussion sections meets each week on Thursdays 3:30-4:30 pm. There will be **three midterm-quizzes given only in person in SGM 101**. The other Thursday Discussion Sessions will be held either in person or by zoom, as notified on Blackboard. This will be the time to discuss challenging end-of-chapter problems, ask questions, and present special research topics and students' projects on the elements (see below). Each midterm exam will be worth 100 points and the solution key will be posted on Blackboard after each midterm exam. **There will also be an in-person two-hours final exam on Thursday, Dec. 7, starting at 8:00 am** at a location to be specified, which will be worth 200 points. **There are no make-up exams. A missed exam without an excused absence approved by the instructor has a zero score. Participation in the final exam is mandatory.**

**Weekly online Quizzes:** There will be 12 online quizzes. These will test your understanding of the material covered up to that point. **You can submit the quiz only once. A new quiz opens at 9:00 a.m. every Wednesday and your answers are due the following Tuesday at 11:59 pm.** 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, and they must be submitted on

time. **The grades of your top 10 quizzes (each worth a maximum of 10 points) will be counted towards your final grade.** These quizzes can only be taken on Blackboard. **Late quizzes are NOT accepted.**

### **Final Class Project: The elements**

Your final assignment includes a final project (80 points). The Periodic Table is a towering achievement of chemistry. Each element tells a fascinating story about its discovery and applications. The special project assigns an element to you, which you will cover with an emphasis on its chemistry. You will be asked to submit on Blackboard **in pdf form** your PowerPoint presentation on this element at the end of the semester. The final project is divided into two parts: first an oral presentation in Power Point form will be given during the discussion session or regular class. Then, the final written pdf document, submitted at the end of the semester, will expand on, and extend the material of the oral presentation.

**Specific instructions for the oral presentation and final written document submissions will be discussed in class and posted in Blackboard.** Specific instructions will include a template submission, a list of topics to be covered, and rules for collaboration among students. Your Final Project will be graded for accuracy, completeness, chemistry relevance, organization, quality of the oral and written presentations, references, and literature citations. **See Blackboard later for details.**

### **Homework and Other Assignments**

Homework problems from the textbook are **assigned each Wednesday** and should be completed in a week. Homework is **not** collected and graded, but it is very important that you do the assigned homework problems to keep up with the course materials and succeed in exams. Answers to even problems will be posted on Blackboard. Challenging problems will be discussed in class or during discussion sessions.

Before each class you will have to read assigned materials and/or watch a video, as posted in the weekly assignments every Monday on Blackboard. Because Chem 115 is an advanced course, the lectures will not necessarily revisit every section in the textbook, especially the basic ones. It is therefore imperative that you complete your reading assignments on time. Even though not all material will be covered in class, your questions about any course material are welcome. **You are expected to spend a total of 8-9 hours per week on this course outside of class times!**

### **Course Notes and videos**

Lecture notes, videos and other materials required for class will be posted each week on Blackboard.

### **TA 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 in Blackboard. Office hour will be carried either in person or on zoom.

### **Supplemental Instruction (SI)**

The University has a Supplemental Instruction Program that we encourage you to use. The SI leaders hold weekly zoom sessions going over the course material and assisting in problem solving. They attend all lectures and are familiar with the lecture material. They work in close cooperation with the course instructor. As upperclassmen who took the same class, they also serve as valuable mentors.

### **Final course grade**

The final course grade is a letter grade from A to F (A, A-, B+, B, B-, C+, C, C-, etc.), We also give **Week 9 grades** to inform you on your progress in the course by assigning an approximate full letter grade (no plus or minus) at the end of the ninth week. This is based on your performance in the course to date.

Note: this advisory grade is no guarantee of your final course grade. You are encouraged to check your scores periodically online.

### Grading

One-Hour Exams	3 @100 points	300
Laboratory	300 points	300
Final Exam	1 @200 points	200
Web Quizzes	10 @10 points	100
Attendance	20 points	20
Special Assignment	80 points	80

**Total: 1000**

### Laboratory

The laboratory portion of the course will be in person. A schedule can be found in the lab manual. You will need to purchase a 100% cotton lab coat, a pair of safety glasses or goggles, the lab manual (download information will be posted in Blackboard), and a bound notebook that will be used exclusively for lab.

There will be a **mandatory asynchronous laboratory orientation that must be completed by Friday 8/25 at 5 pm**. In this orientation you will learn all the expectations for the laboratory portion of the course.

### 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.

### Important dates

Aug. 21	Fall semester classes begin
<b>Aug. 25</b>	<b>Mandatory Asynchronous Lab Orientation – due by 5 pm</b>
Sept. 4	Labor Day, university holiday
<b>Sept. 8</b>	<b>Last day to drop a class without a mark of “W,” except for Monday-only classes, and receive a refund for Session 001</b>
<b>Sept. 14</b>	<b>Midterm Exam 1</b>
<b>Oct. 5</b>	<b>Midterm Exam 2</b>
Oct. 12-13	Fall recess
<b>Nov. 9</b>	<b>Midterm Exam 3</b>
<b>Nov. 10</b>	<b>Last day to drop a class with a mark of “W” for Session 001</b>
Nov. 22-26	Thanksgiving Break
Dec. 1	Fall semester classes end
Dec. 2-7	Study days
<b>Dec. 7</b>	<b>Final exam 8-10 am</b>

## **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](https://policy.usc.edu/scampus-part-b). 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, <https://policy.usc.edu/wp-content/uploads/2021/04/SCampus-Part-B.pdf>.

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.

## **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. For example, cheating on attendance will be reported as misconduct. 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 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.

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

[usc-advocate.symplicity.com/care\\_report](http://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](http://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](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.