

CHEMISTRY 115A - ADVANCED GENERAL CHEMISTRY

FALL 2020 SYLLABUS (draft)

Lecture

Prof. Hanna Reisler; reisler@usc.edu

Office hours: Fri 3-4 pm; or by appointment

Laboratory: Prof. Jessica Parr; parr@usc.edu

Office hours: Th 9-11 am; or by appointment

SI Leader: Alex Maertens, maertens@usc.edu

Class Meetings: This class is offered online. Asynchronous videos will be posted on the course Blackboard website. Synchronous class meetings will be held via Zoom on Mon, Wed, Fri. 9:00-9:50 am; Discussion section is on Thurs: 3:30 -4:30 pm.

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 materials science, nanoscience, medicine, biology, and atmospheric and environmental chemistry. The course will address how physical laws, theories, and models are used in current scientific research, including addressing societal issues such as environmental, climate, and sustainability concerns, 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 will learn to design experiments, collect data, analyze their results and produce written reports, gaining experience in lab procedures and scientific communication in a way that prepares them for undergraduate research. After 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 a chemical system 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 understanding current research topics
- 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 8th 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 and 4-6, and 10 will be covered this semester in this order. The order has been determined to coincide 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 expected. Additional required materials (text, videos, slides, quizzes, etc.) will be posted in Blackboard.

Discussion Section and midterm quizzes

Discussion section meets each week on Thursdays 3:30-4:30 pm. This will be time to discuss challenging end-of-chapter problems, ask questions, present special research topics and students’ projects, and do in-class midterm quizzes. **The midterm quizzed will be given every two weeks, beginning Sept. 3rd, and will start at 4:00 pm exactly.** There will be 6 in-class midterm quizzes, each worth 30 points. Attendance is mandatory.

Homework and 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. Answers to even problems will be posted on the class website. Challenging problems will be discussed in class. Other assignments (in class and for home) will be posted on Blackboard or assigned as independent work during class time, individually and in groups. Assignments include homework, quizzes, laboratory reports, and a special project. 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 critical that you complete your assignments on time. Even though not all material will be covered in class, your questions about the material are welcome. **You are expected to spend a total of 8-9 hours per week outside of class times.**

Weekly online Quizzes: There will be 12 online quizzes. These will test your understanding of the material covered 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 have to 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 the web. Late quizzes are NOT accepted.

Special Project

Each student will be assigned an element and will submit a pdf presentation on this element. Two students will be assigned to each element, and each student will give a presentation during discussion section. Students can continue to work on their assignments even after their presentation. The class will cover 30 atoms, mainly those from rows 1-3. Special instructions will be given later, including a template. Your Special Project will constitute your final course assignment and will be graded for accuracy, completeness, organization, references and literature citation, as well as style and quality of presentation. It will count as 70 points. (14% of the course grade).

Course Notes and videos

Lecture notes, videos and other materials will be available on Blackboard.

Office Hours

You are strongly encouraged to see any TA during their zoom office hours, not just your own. Office hours for all TAs will be posted.

Supplemental Instruction (SI)

The University has a Supplemental Instruction Program that we encourage you to use. The SI instructor holds weekly zoom sessions going over the course material and assisting in problem solving. The SI leader attends the lectures and is familiar with the lecture material. He consults often with the instructor. As an upperclassman who took the same class, he also serves as a mentor.

Grade point distribution

Mid-term in-class quizzes	6 @ 30 points	180
Laboratory	150 points	150
Final Project	70 points	70
Web Quizzes	10 @10 points	100
Total		500

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.

Laboratory

The laboratory portion of the course will also be completely online, taking advantage of an online virtual laboratory program, Beyond Labz. Teaching Assistants will lead a synchronous session working you through the laboratory exercises and a discussion of the results. The lab manual purchased from the USC bookstore will provide you with instructions for the laboratories, and you will also be provided access to Beyond Labz. Instructions for obtaining your license code can be found in the lab folder in the content section of the Blackboard. Seven regular laboratories and two special projects will comprise the assignments for the semester. A schedule can be found in the lab manual.

There will be a mandatory laboratory orientation on Thursday 8/20 at 3:30 pm on zoom. In this orientation you will learn all of the expectations for the laboratory portion of the course.

Academic Integrity. All work submitted in this course must be your original work. 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.). 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/scampuspart-b. See additional information in SCampus and university policies on scientific misconduct, policy.usc.edu/scientificmisconduct.

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 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.

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 Disability Services and Programs - (213) 740-0776

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

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.