

Fall 2021 CHEM105 001 General Chemistry I (Owens) Syllabus

Textbook: 2nd edition of *Chemistry: An Atoms-Focused Approach* Gilbert, Kirss, Foster, Bretz.

Instructor: Pat Owens (owensp@winthrop.edu) Phone: three, two, three, four, nine, two, five

- Zoom Office Hours: T 2:00-2:50 PM, W 2:00-2:50 PM, R 10:00-10:50 AM
- I will also be available to meet in person on Tuesdays from 11:00-12:30 in my Sims312A office reached by first entering the Sims312 computer lab.

Course Objectives:

- Gain an understanding of chemistry's central role in modern science
- Develop intensive study habits and develop problem-solving skills to prepare for advanced science and engineering courses
- Understand the process used by scientists and civilizations to observe, to learn about, and to understand the physical world
- Demonstrate an understanding of the fundamental principles that underlie the modern chemical sciences
- Understand molecular structures and changes that govern physical properties and processes
- Develop an intuitive appreciation for how chemistry affects our daily lives in so many wonderful ways

Course Outline: This is General Chemistry, a rigorous chemistry course for incoming science majors. The class will cover a wide range of modern chemical topics. The thematic focus of the semester will be "Structure, Energy, and Dynamics." The sequence of topics initially parallels the formation of our universe, beginning with light, followed by examination of nuclei, then atoms, building to molecules, and finally collections of molecules culminating in examination of the materials modern societies rely upon for quality of life. This understanding of molecular structure and energy provides the necessary foundation to then examine molecular transformations and the dynamics of bond-making and bond-breaking processes that provide most of this nation's energy, that drive the synthesis of modern materials, that determine the fate of toxic substances released into the environment, and that literally govern life itself.

All chemistry is based upon physics; a good deal of classroom discussion will focus on underlying physical principles. For example, molecules, liquids, and solids are held together nearly entirely by electrostatic charges (Coulombic attractions). The exchange between kinetic and potential energy and the distribution of kinetic energies among large groups of particles represent fundamental concepts used extensively throughout all science and engineering disciplines. Thermodynamics will be closely examined this semester to provide an early introduction for students and to allow the discussion of intermolecular forces, boiling points, vapor pressures and other topics to be presented from a thermodynamic perspective..

Over 80% of our nation's energy needs come from chemical energy production; most of the rest from nuclear power. We will examine these subjects and develop a fundamental understanding of

these processes; we will examine and discuss the inherent limitations on energy production governed by the Second Law of Thermodynamics.

Because of its relevance, students usually find this material to be quite interesting. During the semester, we will examine these specific subjects:

- Electromagnetic Radiation
- Nuclear Chemistry
- Atomic Structure
- Bonding and Molecular Structure
- Reaction Energetics
- Thermodynamics, Entropy, Free Energy and Spontaneity
- States of Matter and Intermolecular Forces
- Modern Materials
- Physical Equilibria
- Chemical Equilibria
- Acid-Base Chemistry
- Redox Reactions and Electrochemistry
- Chemical Kinetics

Schedule: Course materials will be organized by week, each with three class lectures and one problem-solving recitation lecture. Lectures will be on-line in both video and lecture notes formats. Each week, there will be two lecture-based practice problem sets that students must complete and upload for grading by Wednesday and Friday evenings in a single and legible .pdf file. The quiz for each week will be available starting Thursday at noon and must be uploaded by Sunday evenings. The course weekly schedule provides an overview of the specific topics and text sections covered each week. The individual weekly schedules provide the specific lectures, practice problem sets, quiz, and links to upload assignments for grading. All course information is posted on the chemistry department's web page (chem.winthrop.edu), in the class Dropbox and on Blackboard.

Final Exam: The final exam will be on December 8, 2021. The book report will be due on December 10, 2021.

Class Preparation: You are responsible for all assigned material and for all material discussed in lecture. For each lecture, I recommend that you first print out the lecture notes, watch the video, take notes, and then work problems covered in each video as you view these. You can then do the practice problems for that lecture. The text problems have answers in the book and can be done after completing the lecture practice problems. You must work all problems using the Problem-Solving Approach (PSA) best practices used in lectures. There will be a standard 50% cut on those problems that do not use these. It is critically important to learn early how to employ a well-organized and consistent approach to solving problems.

Student Competencies: This course is problem-solving focused; each week's schedule will include a specific list of student learning objectives. Students should expect to face challenging and what may seem like unfamiliar questions on all graded work; this is done to focus attention on competencies that students have not yet fully mastered. Graded work is based on materials that have been covered and students are expected to solve practice problems without instructor assistance as these are modeled on lecture and recitation problems covered earlier and student learning occurs most effectively by working through themselves to solve problems. Students are urged to not fall behind and to master each competency as soon as it is first examined.

Course Requirements and Graded Exercises

- Weekly graded practice problem sets will be assigned and worth 20 points each.
- Weekly quizzes will be worth 40 points each.
- Three 120-point tests (each with a 60-point problem set and a 60-point test) will be given during the weeks noted in the schedule.
- The final exam will cover the entire semester and will be worth 150 points. It will include a 90-point book report assigned to enhance a broader and more in-depth understanding of the central relevance of chemistry in modern societies and a 60-point environmental chemistry problem set integrating concepts covered from throughout the semester.
- Students must complete the final exam by the scheduled class final exam day to be eligible to earn credit for this course.

Grades: Percentages will be calculated based upon total earned points divided by total points tested. The following grade range will be used: A = 93.00-100%; A- = 88.00-92.99%; B+ = 85.00-87.99%; B = 80.00-84.99%; B- = 76.00-79.99%; C+ = 72.00-75.99%; C = 66.00-71.99%; D = 56.00-65.99%; F = <56.00%

Attendance: Course attendance will be measured by student expected participation in uploading completed and organized assignments for grading as outlined each week. Makeup tests and quizzes will not be given.

Students with Disabilities: Winthrop University is committed to providing accessible learning experiences and equal access to education for all students. The syllabus is available in alternate formats upon request. If you are a student with a disability (including mental health concerns, chronic or temporary medical conditions, learning disabilities, etc.) and you anticipate or experience academic barriers due to the condition, please contact The Office of Accessibility (OA) for information on accommodations, registration, and procedures. After receiving approval for accommodations through OA, please make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely manner. OA contact information: accessibility@winthrop.edu; 803-323-3290; 307 Bancroft Hall Annex.

Student Conduct Code: "Responsibility for good conduct rests with students as adult individuals." The policy on student academic misconduct is outlined in the "Student Conduct Code Academic Misconduct Policy" in the online *Student Handbook*

<https://www.winthrop.edu/uploadedFiles/studentconduct/StudentConductCode.pdf>

On-Line Learning: Any student enrolled in courses at Winthrop regardless of modality (traditional in-person, online, hybrid, ...) is entitled access to all campus resources. These resources include, but are not limited to, admissions counseling, recreational facilities, and health, library, and academic services. Questions regarding access to these resources should be directed to the assigned academic advisor.

COVID-19 Statement: During this pandemic period each student is expected to act in the best interest of the WU community by behaving responsibly to limit the spread of the COVID-19 virus. All students, faculty, and staff must wear masks inside buildings and classrooms, unless alone in a private office. All members of the campus community must follow campus guidance on masking. Please do not attend class if you have fever or any signs of the COVID virus; do not attend class if your roommate or someone you have close contact with acquires the virus and be respectful of others' desire to remain COVID-free. Use the Patient Portal COVID-19 Health Tracker daily. Students who violate WU guidelines will be asked to comply. Continued failure to comply may result in referral to the Dean of Students Office as a student conduct violation.

COVID-Related Absence: Students should contact Health Services regarding a positive test, close contact, or enhanced COVID-like symptoms. Any student who has either tested positive, has COVID-like symptoms, or has close contact with someone who has COVID, must contact Health Services. Students should log in to the Patient Portal to schedule a TELEPHONE TRIAGE Appointment w/ COVID as the reason and upload the positive test result if applicable. Health Services will communicate with the student on what steps to take next, and if need be, the Dean of Students Office will get absence verification for required isolation and quarantine. Students who verify their absences through the Dean of Students Office often minimize any academic impact caused by missed class time. Health Services will only provide dates of absence, not medical information. Please note, residential students who test positive should also follow their personal COVID Quarantine and Isolation Plan.