

Fall 2012 CHEM105H General Chemistry I (Owens) Syllabus

This syllabus is a living document; students must check the syllabus posted on the Department web site <http://chem.winthrop.edu/> for any changes prior to every class attendance

- Three lessons (four lecture hours) + one recitation session per week, four credit hours
- Dates reflect M, T, R lecture days for Fall 2012 semester, W is recitation session

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

- Office Hours: SIMS312A- MF 2:00-3:00 PM

Course Texts: *Chemical Principles: The Quest for Insight, 5th Ed*, Atkins & Jones, 2010

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 the first half of 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: Class lectures are scheduled MTR at the appointed hour in the appointed room. A mandatory class recitation session will be conducted every Wednesday for problem solving and for further examination of principles being covered in lectures that week. The course syllabus schedule provides the specific class lecture schedule, topics, announced graded exercises, and assignments. All course information is posted on the chemistry department's web page (chem.winthrop.edu).

Final Exam: Students must take the final exam with their section.

- CHEM105H class that meets Monday at 3:30 PM will have its final exam at 3:00 PM, Friday, December 7, 2012

Class Preparation: You are responsible for all assigned material and for all material discussed in lecture. You are expected to take detailed notes during each lecture and will be responsible for everything discussed in class throughout the remainder of the course. For each class I recommend that you do the following:

- Read assigned lesson for upcoming lecture, take notes
- Work assigned problems; take whatever time is required to understand and to quickly demonstrate an understanding of the assigned exercises for the upcoming lesson

Review previous lecture notes and take whatever time is required to master the material covered in the previous class

- Rework previously assigned problems

Student Competencies: Assigned chapters, class discussion, homework, problem sets, unannounced quizzes, announced quizzes, tests, and the final exam will all center on development and evaluation of student competencies. Students should expect to face challenging and unfamiliar questions on all graded work; this is done to focus attention on competencies that students have not yet fully mastered. Students can be evaluated five to six separate times on a given competency: homework problems, unannounced quizzes, problem sets, announced quizzes, tests, and the final exam. Students are urged to not fall behind and to master each competency as soon as it is first examined.

The course web site will itemize chapter sets of student competencies to more effectively focus student study and to allow student self-evaluation of progress. Links to quizzes given to date will be added to the syllabus schedule as they are returned. Solutions to problem sets and to quizzes will not be posted since more effective student learning occurs through working through these problems individually. Class time will be used to review the quiz and test questions that challenged students most. Periodically, as time allows, graded problem sets will be reviewed in class.

Course Requirements and Graded Exercises

- Unannounced 20-30 point quizzes will be periodically given at the beginning of class to evaluate student understanding of the previous lecture and student understanding of pre-learning exercises assigned for that day's lesson.
- Graded problem sets and homework exercises listed on the syllabus schedule are due at the beginning of class and will be worth 20-30 points each.
- Chapter quizzes will be listed in the syllabus schedule and worth 25-40 points each; no makeups will be given.
- Three 150 point tests will be given on the dates noted in the syllabus; no makeups will be given.
- The final exam (part may include an American Chemical Society test) will cover the entire semester and will be worth 450 points. Students must take the final exam during the scheduled class final exam period to be eligible to earn credit for this course.

Grades: Percentages will be calculated based upon total earned points divided by total points tested. You must score better than 50% on the final exam to pass the course. You must score an A on the final exam to earn an A in the course. 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: You are expected to attend all class meetings for the full scheduled time. A student who is absent for any reason is responsible for obtaining the assignments from the instructor or a classmate. Roll will be taken occasionally and the attendance practices of students will be taken into account when final grades are assigned. Absence from a test or quiz without a written doctor's excuse or similar external agency valid documentation is inexcusable. An unexcused student absence will result in a zero for the missed grade AND a deduction of 20-100 points (determined by the weight

of the missed test) from the student's previously earned points in the course. For excused absences, missed exercises will not be included for neither earned nor total points when calculating overall course grades. Makeup tests and quizzes will not be given.

Students with Disabilities: Winthrop University is dedicated to providing access to education. If you have a disability and require specific accommodations to complete this course, contact Services for Students with Disabilities, at 323-3290. Once you have your official notice of accommodations from Services for Students with Disabilities, please inform me as early as possible in the semester.

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* (<http://www2.winthrop.edu/studentaffairs/handbook/StudentHandbook.pdf>).