Course Overview and Syllabus

CHEMISTRY 0100 – INTRODUCTORY CHEMISTRY

Fall 2013, Brown University, Department of Chemistry, Providence, RI, 02912

Lecture: Mon, Wed, Fri 11:00-11:50 AM, MacMillan 117
Conference Section: Mon or Tue, GeoChem 351, MacMillan 205 or MacMillan 305
website: **canvas.brown.edu/courses/797982**

Instructor: Dr. Margaret Hershberger
Margaret_Hershberger@brown.edu
Office: GeoChem 329
Office Hours: Wed 1-2:30 PM, Thurs 1-2:30 PM, and additional times by appointment

Course Description

In this introductory survey course, we will explore stoichiometry, atomic and molecular structure, chemical reactions, solutions, gases, thermochemistry, chemical bonding, and equilibria. Each week, there are three hours of lecture; this time will include presentations of subject matter, problem solving and discussions among students. Each student should also register for one conference section (1.25 hours) per week; there is no laboratory. During the conference sections, students will work collaboratively to practice solving problems.

The course is S/NC. The only prerequisite for the course is taking the Chemistry Placement Exam through banner.brown.edu. (Students who achieve a score ≥ 8 are encouraged to take Chemistry 0330.)

Aims and Objectives

The aims of this course are for students 1) to develop a chemical perspective on the structure of matter and transformations of matter, 2) to develop problem solving skills and 3) to prepare for Chemistry 330 and beyond. Broadly stated, the objectives of this course are for students 1) to name and classify chemical species and chemical processes, 2) to calculate the amount of matter and number of particles in chemical species or involved in chemical processes, 3) to describe the states of matter 4) to explain the role of energy, especially heat, in chemical processes, and 5) to understand the electronic structure of the atom and how this structure influences the properties of atoms and molecules.

Required Course Materials

1. Tro, Nivaldo J. *Chemistry: A Molecular Approach* 3rd Edition. Pearson, 2014.
2. Access to *MasteringChemistry*, an online homework and tutorial system from Pearson. During registration, be sure to select the correct book (Tro, Chemistry: A Molecular Approach, 3e). The course ID is MHERSHBERGER2013F
3. A scientific calculator. Although programmable calculators are allowed, no programs may be used during exams.
4. An iClicker device.

Either the print or the eTextbook edition of the textbook can be used. The print textbook and access to *MasteringChemistry* are sold as a package at the Brown Bookstore. Access to *MasteringChemistry* and the eText can also be purchased directly from Pearson ($66 without eText; $110 with eText; note that this eText can only be viewed with an active internet connection) at http://masteringchemistry.com/site/register/new-students.html

You can obtain an iClicker device from the Friedman Center in the basement of the Sciences Library. To register your device, go to the iClicker website http://www.iclicker.com/registration and enter the required information. When asked for your Student ID, please enter your Brown username.

Assessment

Grades will be a weighted sum of the following components:

5% – Classroom Participation
5% – Quizzes (12)
10% – Homework
50% – Midterm Exams (3)
30% – Final Exam

Classroom participation will be based on your use of the iClicker device during lecture and on active collaboration with your group as you solve problems during the conference sessions. In addition to receiving help from your group, you will deepen your own understanding of chemistry and develop your own problem solving skills by discussing the problems and describing your reasoning to others.

Quizzes will be administered almost every week during the conference sessions. These quizzes will be short (15 min) and are designed to help you practice solving problems individually after working on similar problems in a group.

Homework will give you more practice solving a wide range of problems. It will be administered online through the *MasteringChemistry* website. Weekly assignments will be posted on the *MasteringChemistry* site and the Canvas site and will be announced in class.

The three midterm exams will occur during the lecture periods on Wednesday, **October 9**; Wednesday, **October 30**; and Friday, **November 22.** The midterms will focus on content from the immediately preceding chapters but will be somewhat cumulative.

The cumulative final exam is scheduled for Friday **December 20** from 2-5 PM.

Chem0100 is a mandatory S/NC class. The grading scale will probably be:

$\geq$ 90%, S with Distinction
$<$90% and $\geq$60%, S
$<$ 60%, NC

Missed Assignments
Unfortunately, I cannot offer make-up midterm exams, quizzes or homework. Under certain circumstances and with documentation from the Dean of the College, I may replace a missing midterm exam score with the average of the other two exams. Missing two midterm exams or the final without documentation will result in a grade of NC.

Exam Regrades
If you discover a mistake in the grading on an exam, do not make any additional marks or erasures on your exam. Describe the nature of the grading error on a separate piece of paper, attach this paper to your exam, and submit the packet to Mr. Eric Ferrara (GeoChem 239) within one week of the date the exam is returned to the class. The entire exam will be regraded, and your final score may be higher or lower than your original score.

Academic Integrity
Please see the university's Academic Code at the website for the Dean of the College, http://www.brown.edu/Administration/Dean_of_the_College/curriculum/academic_code.php. In this course, no collaboration or unapproved materials are allowed for quizzes or exams. Additionally, the online homework should reflect your independent understanding of the course content. However, while working on the homework, you may improve your understanding of the course content by receiving "hints" from the MasteringChemistry website, referring to your textbook, and discussing approaches to the questions with me and your classmates, TAs and tutors. Please see me if you have any concerns.

Expectations
In this class, you will be given many opportunities to develop your understanding of chemistry and your problem solving skills. To make the most of these opportunities, prepare for lecture by familiarizing yourself with the relevant section of the book. Please be ready to take notes and to solve problems in both the lecture and in the conference sessions; bring your notes, iClicker (only needed for lecture), book and calculator. Please do not distract yourself or others with unnecessary use of electronic devices.

Accommodations
Please inform me if you have a disability or other condition that might require some modification of any of these course procedures. You may speak with me after class or during office hours. For more information, contact Students and Employee Accessibility Services at 401-863-9588 or SEAS@brown.edu.

Academic Support
This course will move fairly quickly. Please do not hesitate to seek help at any point during the semester. You can find help at my office hours and at the Science Center on the 3rd floor of the Science Library. The Science Center offers scheduled group individual tutoring sessions. Please see the Canvas site for more details.

Course Calendar (Exam dates are set, but the dates of the topics may change.)

I. **Introduction to Chemical Species and Reactions** (September 4 – October 4)
Exam on October 9

A. Classifying and Measuring Matter (Chapter 1, Appendix 1A)
- states and composition of matter, physical and chemical properties and changes, units, significant figures, scientific notation, dimensional analysis, density

B. Atoms and Elements (Chapter 2)
- development of atomic theory; elements, ions, isotopes and the periodic table; atomic masses; definition of a mole

C. Molecules and Compounds (Chapter 3
- formulas and nomenclature for ionic and molecular compounds, molar mass, molecular formulas and molecular composition

D. Chemical Reactions (Chapter 3.11 and 4)
- balancing chemical equations, stoichiometry calculations, classifying reactions, concentration of solutions and solubility

II. **Description of Gases and the Role of Energy in Reactions** (October 11 – 28)
Exam on October 30

A. Gases (Chapter 5)
- ideal gas law, gas-phase reactions, kinetic theory of gases, van der Waals equation

B. Thermochemistry (Chapters 6 and 11.5-11.7)
- energy, heat and work (without calculus), enthalpy, calorimetry, Hess's Law, standard enthalpies of reactions

III. **A Closer Look at Atoms, Molecules, Solids and Liquids** (November 1 – 20)
Exam on November 22

A. Quantum Mechanical Model of the Atom and Implications of this Model (Chapters 7 and 8)
- description of waves and particles for light and matter, atomic orbitals, electron configurations, periodic trends

B. Bonding and Intermolecular Forces (Chapters 9 and 11.3)
- Lewis model of bonding, electronegativity, lattice energies, bond energies, intermolecular forces

IV. **Equilibrium Phenomena** (November 25 – December 9)

A. Chemical Equilibrium (Chapter 14)
- equilibrium constants and reaction quotients, Le Châtelier's principle, calculating concentrations at equilibrium

B. Acids and Bases (Chapter 15)
- definitions, pH, dissociation of strong and weak acids and bases

Final Exam on December 20
This class will not observe reading period.