

CHEMISTRY 1210  
PRINCIPLES OF CHEMISTRY I  
4 CREDIT HOURS

UTAH STATE UNIVERSITY-EASTERN  
PRICE, UT  
FALL 2021

MWRF 10:30 – 11:20 am  
RV 239

Instructor: Dr. John Weber  
Email: john.weber@usu.edu  
Office Phone: (435) 613-5665

Office Hours: 9:30-10:30 am M-F  
(or by appointment)  
Office No.: RV 250

1. Course content: This course is designed for pre-medical/dental, pre-engineering, chemistry, and science students. Concepts include units and dimensional analysis, the importance of the periodic table, stoichiometry, properties of solutions, atomic/molecular theory, bonding and molecular structure, thermochemistry, properties of gases, chemical bonding, states of matter, and selected topics.

2. Pre-requisites: Successful completion of MATH 1050 or higher or a Math ACT score of at least 25.

3. Required Textbook and Supplies: Textbook: "Chemistry" -- 5th Edition, McMurry & Fay, Publisher: Pearson Prentice Hall, ISBN 978-0-13-199323-5; scientific calculator, iClicker and a Periodic Table. You *should* bring your periodic table and calculator to class. You *must* bring your calculator to exams.

4. Course Objectives: At the successful completion of this course students should understand the concepts listed under 'course concepts' as well as be able to think critically about and solve problems related to the concepts. The art of critical thinking will be developed in each student by requiring them to think logically, as well as abstractly. The problem solving exercises and recitation assignments require the use of abstract, quantitative and logical reasoning as well as complex problem solving skills. Students will practice and develop their writing skills on quizzes, exams and recitation assignments. Teamwork skills employed in small groups will aid in successful completion of recitation and homework assignments. The history of chemistry will be reviewed throughout the course, and the material will be interwoven in related topics such as geology, biology, and physics. Concepts will be applied to real-world settings with an emphasis on applying knowledge gained to effect situations encountered in our daily experiences.

General course learning objectives include:

1. Develop knowledge of key facts as outlined during the course
2. Develop a suitable knowledge of the vocabulary of chemistry
3. Ability to explain chemical and physical properties using the periodic table
4. Ability to explain chemical and physical properties of macroscopic materials in terms of microscopic (atomic and molecular) structure.
5. Be able to explain chemical and physical properties of materials based upon their quantum structure.
6. Explain shapes of molecules based upon their electronic structure.
7. Relate physical properties of materials to the shape of the constituent molecules.
8. Provide a microscopic description of the 3 common phases of matter.
9. Perform quantitative stoichiometric calculations interchangeably using mass, moles, volumes, etc.

Some additional specific course learning objectives include (but are not limited to):

Describe units of measurement for mass, length, velocity, time  
Use the metric system of units and perform conversions mathematically  
Perform calculations utilizing correct significant figures  
Identify and describe the particles inside an atom and describe the structure of an atom  
Know the Periodic Table in relation to: atomic number; atomic mass; valence electrons  
Be able to name simple atoms and general ionic and molecular compounds  
Balance chemical equations  
Differentiate between a chemical formula and an empirical formula  
Define units of solution concentration  
Define an acid, a base, a salt, and electrolyte  
Calculate formula weights and perform stoichiometric calculations  
Determine theoretical yields and experimental yields  
Utilize the First Law of thermodynamics and Hess's Law  
Be able to calculate enthalpies of balanced chemical reactions  
Describe the nature of electromagnetic radiation  
Describe the origin of line spectra and how they lead to quantum numbers  
Describe Bohr orbitals and the structure of a many-electron atom  
Describe the shapes of the Atomic Orbitals (s, p, d, f)  
Utilize the Periodic Table to predict atomic trends in size and ionization energies  
Draw Lewis diagrams for atoms and polyatomic species  
Describe the Octet Rule and draw resonance structures  
Predict molecular shapes using the Valence Shell Electron Repulsion Model  
Predict molecular polarity  
Differentiate single, double, and triple bonds and estimate relative bond energies  
Describe the notion of hybrid orbitals and when this approximation works  
Describe the properties of gases  
Utilize the gas laws of Boyle, Charles, and Avogadro to calculate gas properties  
Perform calculations using the Ideal Gas Law and understand its limitation  
Describe and differentiate between the solid, liquid, and gas phases

Define the term colligative property

Show how vapor pressure of a solvent is affected by solute concentration

5. Classroom Accommodation for Students With Different Abilities USU welcomes students with disabilities. If you have, or suspect you may have, a physical, mental health, or learning disability that may require accommodations in this course, please contact the Disability Resource Center (DRC) as early in the semester as possible (435-797-2444, [drc@usu.edu](mailto:drc@usu.edu)). All disability related accommodations must be approved by the DRC. Once approved, the DRC will coordinate with faculty to provide accommodations.

6. Policies and Procedures:

- a. Attendance Policy: Attendance will neither be taken nor graded, but it is highly recommended that you attend class.
- b. Hours of lecture each week: 50 minutes on MWRF from 10:30-11:20am. Lab meets on Monday or Tuesday (RV 230) for 3 hours from 3:00 – 5:50pm on Monday and from 1:30pm-4:20pm on Tuesday.
- c. Textbook assignments: Reading and problem assignments will be given in class. Answers to selected problems may be found in the appendix of the textbook. Similar questions will appear on the exams.
- d. Academic integrity is expected in all your work. The University standard for academic integrity may be found at <http://www.usu.edu/policies/PDF/Acad-Integrity.pdf>
- e. Canvas will be used to manage this course. Lecture notes, the syllabus, grades, homework assignments, and resource materials will be available through Canvas.

7. Laboratory (CHEM 1215): The laboratory section is a separate course. You will receive separate grades for CHEM 1210 and CHEM 1215.

8. Grading Procedures:

Grades will be based on your performance on four regular exams, a final exam, regular quizzes, and homework/recitation assignments. Quizzes will be

unannounced and will focus on current lecture topics. The average of your quiz scores will count equivalent to one regular exam. Exams will focus on the most recent topics but all exams including the final may be considered to be 'cumulative'. The score of the final exam may be used to replace the lowest score on a regular exam. The final exam may not replace the quiz score. A total of 650 points are possible to be earned during the course: 450 points from exams, 100 points from the final, and 100 points from homework and recitation assignments.

No make-up exams will be given except as a result of scheduled school activities. If you have conflicts with an exam time as a result of scheduled school activities, you must inform me in advance and in writing on school letterhead with your advisor/instructor stating the nature of the conflict. There will be no opportunities to make up quizzes or recitation assignments.

Grades will be assigned based on the following standard:

A	92-100%
A-	90-91%
B+	87-89%
B	82-86%
B-	80-81%
C+	77-79%
C	72-76%
C-	70-71%
D	60-69%
F	<60%

There will be no 'curve' applied to the exam results.

9. Topical Outline for the Course:

Chapters 1, 2a, 5	Exam 1	Sep. 24
Chapters 2b, 3, 4	Exam 2	Oct. 22
Chapters 6-7	Exam 3	Nov. 5
Chapter 8-9	Exam 4	Nov. 19
Chapter 10 ("half" exam)	Exam 5	Dec. 8

The comprehensive Final Exam will be given Dec. 17<sup>th</sup> from 9:30am-11:20am. You will take the American Chemical Society normed test.

Important dates:

- Sep. 6            Labor Day Holiday (no class)
- Oct. 15           Fall Break (no class)
- Nov. 24-26      Thanksgiving Holiday (no classes)
- Dec. 14-18      Finals Week

10. Help options: Come to regularly scheduled office hours. I will attempt to meet at other times if you have a conflict during my office hours. Check the schedule posted on my office door. Don't wait until the day before the test to come for help. Avail yourself of the discussion board and chat room at the course Canvas site to discuss issues and problems with your classmates. Find a study partner or small group. While you will need to be able to work problems on your own, collaboration is encouraged when working the textbook problems and recitation assignments.

*The instructor reserves the right to make changes to this syllabus at any time throughout the semester. Such changes will be announced during class and posted on the course Canvas page. Students not attending class are still responsible for knowing about any and all changes to the syllabus.*