

CHEM 203: General Chemistry II (with lab)

General Information:

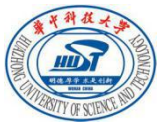
Term: 2021 Summer Session	
Instructor: Staff	
Language of Instruction: English	
Classroom: TBA	
Office Hours: TBA	
Class Sessions Per Week: 5	Lab Sessions Per week: 2
Total Weeks: 5	Total Weeks: 5
Total Class Sessions: 25	Total Laboratory Sessions: 10
Class Session Length (minutes): 145	Lab Session Length (minutes): 145
Credit Hours: 5	

Course Description:

General Chemistry II will learn knowledge and critical thinking skills to explore their scientific interests further, whether in chemistry, biology, medical fields, or other areas. The course topics are including chemical thermodynamics, chemical equilibrium, electrochemistry, organic Chemistry, nuclear chemistry, kinetics, and descriptive chemistry. This course aims to help students apply the analytical and quantitative skills learned to explain the concepts of enthalpy and equilibrium to use them to solve different problems, to understand reaction rates, and to determine whether a substance is an acid or base, to understand how a buffer solution works. Students will build a further understanding of the related theoretical principles through a hands-on experience of basic laboratory.

Course Format and Requirements:

Class time will be used for a combination of lectures, class discussions, and student presentations. Attendance is essential for earning a good grade. Important information and changes in the class schedule will be presented in lecture. Students are responsible for



getting notes and information from any missed lectures. Attendance will not be taken, since all quizzes will be given at the very beginning of class and there's no made-up option.

Course Materials:

1. **Textbook - Chemistry: *The Molecular Nature of Matter and Change***, 8th Ed., by Martin S. Silberberg
2. **Lecture notes**

Course Assignments:

Quizzes 15%

Quizzes will usually consist of True-False, multiple choices and short answer questions. 7 quizzes will be given and the two lowest will be dropped.

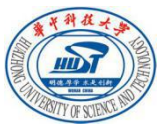
Exams (20%+20%+30%)

Two midterms and one final exam will be given in this class. The material covered on each examination will include everything in the assigned chapters. The exams will be most similar to the questions in the textbook, and the recitation quiz questions. Sample exams will be distributed prior to each midterm. A sheet of standard formulas and physical constants will be provided with each exam. All other notes, books, programs or other prepared materials may not be used during the test. Calculators may not be shared.

To be fair to all students, questions about what will be covered on exams will be answered in class only. No such questions will be answered by telephone or e-mail.

Lab Assignments 15%

Lab grading depends on in-class worksheets, participation, lab reports and the lab final exam or presentation.



Specific due dates for projects and more detailed lab policies will be given in lab. Attendance at labs is mandatory. Students missing 3 or more labs, whether excused or unexcused, will receive an F grade for the course.

Course Assessment:

Quizzes (5 out of 7)	15%
Lab Assignments	15%
Midterm Exam 1	20%
Midterm Exam 2	20%
Final Exam	30%
Total	100%

Grading Scale (percentage):

A+: 98%-100%

A: 93%-97%

A-: 90%-92%

B+: 88%-89%

B: 83%-87%

B-: 80%-82%

C+: 78%-79%

C: 73%-77%

C-: 70%-72%

D+: 68%-69%

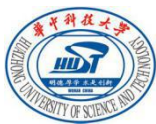
D: 63%-67%

D-: 60%-62%

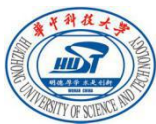
F: Below 60%

Course Schedule:

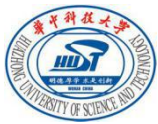
Week	Topic	Activities
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1	<p>Introduction to the course & Syllabus;</p> <p>Properties of Solutions;</p> <p>Thermodynamics:</p> <ol style="list-style-type: none">1) Energy, enthalpy, heat transfer, heat capacity, changes of state 1 st law of thermo., enthalpy changes in reactions, calorimetry;2) Bond energies, standard enthalpies, Hess's law calculations Driving forces of chemical rxns: 2nd law of thermo., entropy	<p>Quiz1</p>
2	<p>Equilibrium:</p> <ol style="list-style-type: none">1) Particulate view of reaction rates, reaction mechanisms, catalysis Equilibrium, reaction quotient vs eqm constant, direction of rxn2) Disturbing a system at equilibrium (Le Châtelier's principle) Application of equilibrium concepts & calculations <p>Acid-Base Equilibrium:</p> <ol style="list-style-type: none">1) Acid-base definitions, pH scale, role of water Acid-base conjugate pairs, ionization constants2) Lewis acid-base model, molecular structure & acidity/basicity Solutions of salts, calculating pH of weak acid/base solutions <p>Review for Midterm Exam 1</p>	<p>Quiz 2</p> <p>Midterm1</p>
3	<p>Acid-Base Equilibrium:</p> <ol style="list-style-type: none">3) Acid-based rxns, acid-base titrations, pH indicators Polyprotic acids; common ion effect, buffers & controlling pH <p>Solubility Equilibria:</p> <p>Ionic solubility, solubility product, precipitation rxns, complex</p>	



	<p>ions</p> <p>Chemical Kinetics:</p> <p>Reaction rates, experiments to find rate laws Integrated rate laws, half-life, concentration-time relationships</p>	Quiz 3 &4
4	<p>Electrochemistry:</p> <p>Oxidation; Reduction; Balanced Electrochemistry Equations;</p> <p>Introduction to Organic Chemistry</p> <p>Organic Nomenclature & Structure;</p> <p>Liquids & Solutions:</p> <p>1) Entropy & Gibbs free energy changes in chemical reactions Spontaneity & equilibrium; ...Intermolecular forces</p> <p>2) Intermolecular forces & properties of liquids Solution composition, dissolution, factors affecting solubility</p> <p>Review for Midterm Exam 2</p>	Quiz 5&6 Midterm2
5	<p>Liquids & Solutions:</p> <p>3) Colligative properties: vapors pressure, boiling & freezing points Osmotic pressure, true solutions vs colloids</p> <p>Nuclear Chemistry:</p> <p>Nature of the nucleus, modes of decay, zone of stability; Kinetics of radioactive decay; Fission; Fusion; Binding energy; Nuclear transmutation; Biological effects of radiation;</p> <p>Review for Final Exam</p>	Quiz 7 Final Exam

**Lab Schedule:**

Lab 1: Thermodynamics

Lab 2: Enthalpy

Lab 3: Rate of Chemical Reactions

Lab 4: Hardness of Water

Lab 5: Properties Systems in Equilibrium- Lechatelier's Principle

Lab 6: Determination of equilibrium Constant

Lab 7: PH Measurements-buffers and Their Properties

Lab 8: Acid Base Titration

Lab 9: Voltaic Cells

Lab 10: vapors pressure

Lab Final Presentation

Academic Integrity:

Students are encouraged to study together, and to discuss lecture topics with one another, but all other work should be completed independently.

Students are expected to adhere to the standards of academic honesty and integrity that are described in the Huazhong University of Science & Technology's *Academic Conduct Code*.

Any work suspected of violating the standards of the *Academic Conduct Code* will be reported to the Dean's Office. Penalties for violating the *Academic Conduct Code* may include dismissal from the program. All students have an individual responsibility to know and understand the provisions of the *Academic Conduct Code*.

Special Needs or Assistance:

Please contact the Administrative Office immediately if you have a learning disability, a medical issue, or any other type of problem that prevents professors from seeing you have learned the course material. Our goal is to help you learn, not to penalize you for issues which mask your learning.

