Syllabus 1447 (2025-2026)
GENERAL CHEMISTRY 1
(CHEM 101)

Textbook: *Raymond Chang*, Chemistry, 14th edition, 2022

Topics	Page Number	Lecture hours
Ch1: Measurement and the Properties of Matter		
1.1 Chemistry: A Science for the Twenty-First Century	2	**3**
1.2 The Scientific Method	4	
1.3 Measurements	6	
1.4 Handling Numbers	13	
1.5 Dimensional Analysis in Solving Problems	20	
1.7 Classification of matter	25	
Review and Exercises		
Ch2: Atoms, Ions, and Molecules		
2.1 The Atomic Theory	41	**5**
2.2 The Structure of the Atom	43	
2.3 Atomic Number, Mass Number, and Isotopes	49	
2.4 The Periodic Table	51	
2.5 Molecules and Ions	54	
2.6 Chemical Formulas	55	
2.7 Naming Compounds	60	
Review and Exercises		
Ch3: Mass Relationships in Chemical Reactions		
3.1 Atomic Mass	80	**6**
3.2 Avogadro's Number and Molar Mass of an Element	82	
3.3 Molecular Mass	85	
3.4 The Mass Spectrometer	88	
3.5 Percent Composition of Compounds	90	
3.6 Experimental Determination of Empirical Formulas	93	
3.7 Chemical Reactions and Chemical Equations	95	
3.8 Amounts of Reactants and Products	100	
3.9 Limiting Reagents	104	
3.10 Reaction Yield and Atom Economy	108	
Review and Exercises		
Ch4: Reactions in Aqueous Solutions		
4.1 General Properties of Aqueous Solutions	125	**5**
4.2 Precipitation Reactions	127	
4.3 Acid-Base Reactions	132	
4.4 Oxidation-Reduction Reactions	138	
4.5 Concentration of Solutions	150	
4.6 Gravimetric Analysis	155	
4.7 Titrations	157	
Review and Exercises		

Ch5: Gases		
5.1 That Exist as Gases 5.2 Pressure of a Gas 5.3 The Gas Laws 5.4 The Ideal Gas Equation 5.5 Gas Stoichiometry 5.6 Dalton's law of Partial Pressures 5.7 The Kinetic Molecular Theory 5.8 Deviation from Ideal Behavior	176 178 181 188 196 199 205 214	**6**
Review and Exercises		
Ch6: Thermochemistry		
6.1 The Nature of Energy and Types of Energy 6.2 Energy Changes in Chemical Reactions 6.3 Introduction to Thermodynamics 6.4 Enthalpy of Chemical Reactions 6.5 Calorimetry 6.6 Standard Enthalpy of Formation and Reaction 6.7 Heat of Solution and Dilution	231 232 234 241 247 253 259	**6**
Review and Exercises		
Ch7: Quantum Theory and the Electronic Structure of Atoms		
7.1 From Classical Physics to Quantum Theory 7.2 The Photoelectric Effect 7.3 Bohr's Theory of the Hydrogen Atom 7.4 The Dual Nature of the Electron 7.5 Quantum Mechanics 7.6 Quantum Numbers 7.7 Atomic Orbitals 7.8 Electron Configuration 7.9 The Building-Up Principle	274 281 283 290 294 297 300 305 312	**5**
Review and Exercises		
Ch12: Physical Properties of Solutions		
12.1 Types of Solutions 12.2 A Molecular View of the Solution Process 12.3 Concentration Units 12.4 The Effect of Temperature on Solubility 12.5 The Effect of Pressure on the Solubility of Gases 12.6 Colligative Properties of Nonelectrolyte Solutions 12.7 Colligative Properties of Electrolyte Solutions	528 529 532 536 538 541 552	**6**
Review and Exercises		
TOTAL HOURS		**42**

• **Grading:**

1- Mid Exam 1	15 points
2- Mid Exam 2	15 points
3- Laboratory Experiments	30 points
4- Final Exam	40 points
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TOTAL	100 points

• **Mid Exam 1**

1- Ch1: Measurement and the Properties of Matter
2- Ch2: Atoms, Ions, and Molecules
3- Ch3: Mass Relationships in Chemical Reactions

• Mid Exam 2

1- Ch4: Reactions in Aqueous Solutions
2- Ch5: Gases
3- Ch6: Thermochemistry

• **Final Exam**

All chapters

Instructions for Computer-Based Exams (QQ)

- Only one device is allowed (using only smartphone or tablet) with the QQ application installed. Using any additional device or a different application is forbidden per the regulations and policies governing the computerized examinations.
- The device battery level must be above 50%, and power-saving mode must be disabled.
- Ensure a stable internet connection before starting the exam.
- Prior to entering the examination, students must verify their ability to access the application. In case of any technical issues prior to the exam, a support request must be submitted via: https://its.ksu.edu.sa
- The exam access code will be provided only once and will not be repeated again.
- After starting the exam, closing the screen or using the device for any other purpose is prohibited.
- Bring a pen; a paper draft sheet will be provided and must be turned in after exam completion and prior to leaving the exam's room.
- Any technical issues/malfunctions during the exam must be reported immediately to the invigilator.
- Students are not permitted to leave before half of the allotted time has elapsed.
- **Important Note:** All exams of this course (midterms and final) are conducted exclusively via the QQ application. NO paper-based exam will be administered under any circumstances.

Practice Computer-Based Exams (QQ)

Two practice computer-based exams will be conducted as a preparation for the first midterm exam:

- First Practice Exam:
  - Conducted during Week 4 of the semester.
  - Administered during the scheduled lecture time.
  - The practice exam duration time is ~ 10 min.
- Second Practice Exam:
  - Conducted prior to the first midterm exam.
  - Available during the weekend.
  - To be completed remotely from home.
  - The practice exam duration time is ~ 10 min.