

The University of Jordan
Department of Chemistry
General Chemistry 1 (0303101)
Course Syllabus. First Semester 2023/2024

I) TEXTBOOK:

General Chemistry, D. Ebbing and S Gammon, 11th edition, Cengage Learning, 2017.

II) EVALUATION SCHEME, GRADING SYSTEM & EXAM DATES:

Quiz	20%	Date and time: To Be Announced
Midterm exam	30%	Date and time: To Be Announced
Final exam	50%	Date and time: To Be Announced

Total	100%
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The letter grade scale is adopted at The University of Jordan.

III) COURSE OUTLINE:

1. Chemistry and Measurement (3 lectures)

1.1 Modern Chemistry; **1.2** Experiment and Explanation; **1.3** Law of Conservation of Mass; **1.4** Matter: Physical State and Chemical Composition; **1.5** Measurement and Significant Figures; **1.6** SI Units; **1.7** Derived Units; **1.8** Units and Dimensional Analysis.

2. Atoms, Molecules, and Ions (4 lectures)

2.3 Nuclear Structure and Isotopes; **2.4** Atomic Weights; **2.8** Naming Simple Compounds; **2.9** Writing Chemical Equations; **2.10** Balancing Chemical Equations. *Excluded sections: 2.1, 2.2, 2.5, 2.6, 2.7*

3. Calculations with Chemical Formulas and Equations (5 lectures)

3.1 Molecular Weight and Formula Weight; **3.2** The Mole Concept; **3.3** Mass Percentages from the Formula; **3.4** Elemental Analysis: Percentages of Carbon, Hydrogen, and Oxygen; **3.5** Determining Formulas; **3.6** Molar Interpretation of a Chemical Equation; **3.7** Amounts of Substances in a Chemical Reaction; **3.8** Limiting Reactant, Theoretical and Percentage Yields.

4. Chemical Reactions (5 lectures)

4.1 Ionic Theory of Solutions and Solubility Rules; **4.2** Molecular and Ionic Equations; **4.3** Precipitation Reactions; **4.4** Acid-Base Reactions; **4.5** Oxidation-Reduction Reactions; **4.6** Balancing Simple Oxidation-Reduction Equations; **4.7** Molar Concentration; **4.8** Diluting Solutions; **4.9** Gravimetric Analysis; **4.10** Volumetric analysis.

5. **The Gaseous State (5 lectures)**

5.1 Gas Pressure and Its Measurement; 5.2 Empirical Gas Laws; 5.3 The Ideal Gas Law; 5.4 Stoichiometry Problems Involving Gas Volumes; 5.5 Gas Mixtures: Law of Partial Pressures; 5.6 Kinetic Theory of an Ideal Gas; 5.7 Molecular Speeds: Diffusion and Effusion; *Excluded section: 5.8.*

6. **Thermochemistry (5 lectures)**

6.1 Energy and Its Units; 6.2 First Law of Thermodynamics, Work and Heat; 6.3 Heat of Reaction, Enthalpy of Reaction; 6.4 Thermochemical Equations; 6.5 Applying Stoichiometry to Heats of Reaction; 6.6 Measuring Heats of Reaction; 6.7 Hess's Law; 6.8 Standard Enthalpies of Formation. *Excluded section: 6.9.*

7. **Quantum Theory of the Atom (3 lectures)**

7.5 Quantum Numbers and Atomic Orbitals.
Excluded sections: 7.1; 7.2; 7.3; 7.4.

8. **Electron Configurations and Periodicity (4 lectures)**

8.1 Electron Spin and Pauli Exclusion Principle; 8.2 Building-Up Principle and the Periodic Table; 8.3 Writing Electron Configurations Using the Periodic Table; 8.4 Orbital Diagrams of Atoms, Hund's Rule; 8.6 Some Periodic Properties. *Excluded sections: 8.5, 8.7*

9. **Ionic and Covalent Bonding (5 lectures)**

9.1 Describing Ionic Bonds; 9.2 Electron Configurations of Ions; 9.3 Ionic Radii; 9.4 Describing Covalent Bonds; 9.5 Polar Covalent Bonds and Electronegativity; 9.6 Writing Lewis Electron-Dot Formulas; 9.7 Delocalized Bonding: Resonance; 9.8 Exceptions to the Octet Rule; 9.9 Formal Charge and Lewis Formulas; 9.10 Bond Length and Bond Order; 9.11 Bond Enthalpy.

10. **Molecular Geometry and Chemical Bonding Theory (3 lectures)**

10.1 The Valence-Shell Electron-Pair Repulsion (VSEPR) Model; 10.2 Dipole Moment and Molecular Geometry; 10.3 Valence Bond Theory; 10.4 Description of Multiple Bonding. *Excluded sections: 10.5; 10.6, 10.7.*

Academic Integrity: All students are expected to follow the rules and instructions of The University of Jordan. Absences exceeding 15% of the total number of class meetings will result in (F) grade. All incidents of cheating or breaching the discipline, during the class meeting and/or the exam, will be taken very seriously and will not be tolerated.

A piece of advice to our students: Keep up to date in your study. Cramming does not work in chemistry courses. Work out, by yourself, as many exercises and problems as you can (you'll find a lot of them at the end of each chapter). Remember that chemistry is studied with a pen in the hand and a lot of papers on the desk! By doing so, it is most likely that you will have a deep understanding of the subject and will get excellent marks. *Good Luck!*