

The University of Jordan
Department of Chemistry General Chemistry 1
(0303101) Course Syllabus
FALL 2022/2023

Textbook:

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

Evaluation scheme, grading system & exam dates:

- The evaluation scheme is not yet determined it will be announced once ready.
- The letter grade scale is adopted at The University of Jordan. All numerical grades will be transformed in to letter grade according to a scale that is determined at the end of the semester.

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 **5.7** Molecular Speeds: Diffusion and Effusion. *Excluded sections: 5.6, 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)

7.1 The Wave Nature of Light **7.2** Quantum Effects and Photons **7.3** The Bohr Theory of the Hydrogen Atom **7.4** Quantum Mechanics **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*

Online Class Requirements:

For online or blended learning classes, all students are required to make sure that they have what is necessary for a successful distant learning, which includes but not exclusive to:

- 1- Have a good computer, tablet or mobile phone that meets the minimum requirement for the software packages used (MS Teams, Zoom, E-Learning, JUexams.com, ...)
- 2- Have fast enough and stable internet connection

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. Attendance is automatically tracked and recorded for every class meeting. 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. Any student who misses an exam, for any excused reason, must submit a proof of the excuse to the instructor within three days, so that a makeup exam will be scheduled. Otherwise the student gets zero in that exam.

Covid-19:

Protect yourself and others around you by knowing the facts and taking appropriate precautions. To prevent the spread of COVID-19:

- Clean your hands often. Use soap and water, or an alcohol-based hand rub.
- Maintain a safe distance from any other people.
- Don't touch your eyes, nose or mouth.
- Wear surgical mask (or equivalent) all time during the class meeting.
- Stay home if you feel unwell.

Communication:

The University of Jordan provides a great tool for the students and their professors to communicate and exchange ideas. Login into your account on the model at: <https://elearning.ju.edu.jo/> or MS-Teams group your instructor makes, make sure to check all posts daily.

PLEASE ASK US IF YOU ARE CONFUSED ABOUT ANYTHING