# CP CHEMISTRY – TOPICS SEQUENCE

Textbook Resource: World of Chemistry. Zumdahl, Zumdahl and DeCoste. Brooks/Cole, Cengage Learning. 2007

## SEMESTER I:

### Unit 1: Introduction to Lab Techniques and Measurement (Chapters 1, 5)

Why is the study of chemistry an important part in the development of one's overall scientific literacy?

- The scientific method and safe experimentation
- Common laboratory techniques and procedures
- Introduction to inquiry in chemistry
- Measurement: metric units, unit conversions, and scientific notation
- Density

### Unit 2: Matter, Atomic Structure, and Nuclear Chemistry (Chapters 2, 3, 19)

How do atoms form the basic structure of all matter? and How do differences in structure effect the properties of matter?

- Classification of matter
- Chemical and physical properties
- Select topics of historic and modern atomic theory
- Atomic structure and isotopes
- Radioactivity and nuclear reactions

### Unit 3: The Periodic Table and Chemical Bonding (Chapters 3, 12)

How does the 3-dimensional arrangement of atoms in a molecule and the way in which they are bonded to one another determine the properties of a substance?

- Development and use of the periodic table and trends in properties
- Valence electron arrangements of representative elements
- Models of Ionic, Covalent, Polar Covalent Bonding
- General properties of representative compounds

### Unit 4: Formulas and Nomenclature of Chemicals (Chapters 4, 21)

- Ionic Compounds (Type I and Type II)
- Molecular Compounds
- Polyatomic Ions

### Unit 5: Unique Properties of Water (Chapter 14,15)

What are the unique properties of water and why are they important to life on Earth?

- Adhesion
- Cohesion
- Surface Tension
- Hydrogen Bonds
- V - Shaped or Bent
- Density of Water
- Specific Heat of Water

# Midterm Exam and Lab Assessment

## SEMESTER II: Quantitative Concepts in Chemistry

**Unit 6:** **Introduction to Chemical Reactions and Equations (Chapters 7, 8, 17)**

How do chemists describe and classify chemical reactions?

- Chemical reactions and equations
- Law of conservation of mass and balancing equations
- Law of conservation of energy and disorder in chemical reactions
- Reaction rates and equilibrium
- Enzymes as catalysts and the factors that affect enzyme function

**Unit 7:** **The Mole and Chemical Composition (Chapter 6)**

How is the concept of the mole applied to chemical compounds and mixtures?

- Introduction to the mole and counting by weighing
- Molecular and Molar Mass
- % Composition of compounds
- Empirical and molecular formulas

**Unit 8:** **Stoichiometry (Chapter 9)**

How is the concept of the mole used to quantify chemical reactions?

- Stoichiometry
- Concept of limiting and excess reactants
- Percent Yield (actual and theoretical yields)

**Unit 9:** **Heat, Temperature, and Phase Changes (Chapters 10 & 14)**

How does the Kinetic Theory describe the relationship between states of matter, energy, and temperature?

- Heat vs temperature
- Energy and changes in states of matter
- Specific Heat Capacity
- Heating/Cooling Curves

**Unit 10:** **Solutions (Chapters 15, 16)**

How do chemists describe the composition, reactions, and properties of solutions?

- Concentration (mass %, molarity)
- Reactions of aqueous solutions
- Solution stoichiometry
- Dilutions

**Unit 11:** **Acid-Base Chemistry (Chapter 16)**

How can we identify an acid or base and describe its strength?

- Properties, structure and identification
- Strength and Equilibrium
- pH and pOH
- Acid Base calculations
- Buffers
- Titrations
- Polyprotic acids and polybasic bases

**Unit 12:** **Atmospheric and Environmental Chemistry (Chapters 13 and 10)**

How is chemistry play a role in our environment?

- Composition of atmosphere and behavior of gases
- Fossil fuels, $CO_2$ and changes in atmospheric composition
- Recycling, plastics, polymers

# Final Exam and Lab Assessment