Textbook: *Modern Chemistry*, Davis, Metcalfe, Williams, and Castka, Holt,Rinehart, and Winston, 2002

Grade Determination:

Semester Grade: Tests = 75 %; Classwork (Homework and Labs) = 25 %; Participation = Extra Credit

Final Grade: 0.40 × (Semester 1 + Semester 2) + 0.20 × Final Exam (Cumulative)

Chapter	Topic
1-2	**Topic 1: Introduction** **Topic 1A: Measurement** 1. Factor label (unit analysis) 2. Metric units and prefixes 3. Scientific notation 4. Significant figures 5. Errors of measurement
1	**Topic 1B: Matter** 1. Nature of matter 2. Elements and their symbols 3. Comparing compounds and mixtures 4. Separating mixtures 5. Types of mixtures
3, 4	**Topic 2: Atomic Structure** 1. Greek philosophy - Democritus vs. Aristotle 2. Atomic models a. Daton b. Thomson c. Rutherford d. Bohr?Plank e. Quantum mechanical 3. Electron configurations - Aufbau principle 4. Major subatomic particles 5. Drawing atomic diagrams a. Bohr-Rutherford b. Electron dot 6. Average atomic mass 7. Nuclear particles; isotopes 8. Nuclear equations 9. Natural radioactivity; radioactive decay
5	**Topic 3: Periodic Table** 1. Historical development a. Menedeleev b. Moseley 2. Reading the Periodic Table 3. Trends in the Periodic Table 4. Families on the Periodic Table

Chapter	Topic
6, 7	**Topic 4: Bonding and Molecular Shape** 1. The nature of bonding 2. Ionic bonds a. determining the charge on an ion 3. Covalent bonds 4. Determining bond type 5. Drawing Lewis structures 6. Exceptions to the octet rule 7. VSEPR and molecular shape 8. Polar molecules - bonding and symmetry 9. Interpreting chemical formulas 10. Cross-over rule 11. Writing formulas and naming compounds a. Stock system b. Determining the charge on the metal ion c. Binary covalent 12. Metallic bonding 13. Intermolecular forces 14. Comparing ionic and covalent substances
8, 9	**Topic 5: Formulas and Equations** 1. Determining formula mass 2. Empirical formulas 3. Percent composition 4. Recognizing chemical changes 5. Writing chemical equations 6. Reaction types a. synthesis b. decomposition c. single replacement d. double replacement 7. Conservation of mass 8. Balancing equations 9. Moles 10. Determining formulas from percent composition 11. Mole ratios 12. Mass-mass problems 13. percent yield; 14. limiting reactant;
10, 11, 12	**Topic 6: Phases of Matter** 1. Heat and specific heat 2. Kelvin scale 3. Comparing solids, liquids, and gases 4. Phase changes a. Kinetic molecular theory b. Heating curve c. Vapor pressure 5. The combined gas law 6. Avogadro's Law 7. The ideal gas law 8. Gas stoichiometry 9. mass and volume problems; 10. Assumptions of the gas laws - ideal gases

Chapter	Topic
13, 14	**Topic 7: Solutions** 1. Factors that influence solubility 2. Saturation 3. Concentration 4. Molarity/molality 5. solution stoichiometry
17, 18	**Topic 8:Kinetics and Equilibrium** 1. Collision theory 2. Transition state theory - activated complex 3. Reaction coordinate (ΔH) 4. Hess's law;ΔH from bond dissociation energy 5. Entropy (ΔS) 6. Gibbs free energy 7. Rate of chemical reactions 8. Factors influencing equilibrium 9. Le Chaltelier's principle 10. Law of chemical equilibrium
15, 16	**Topic 9: Acids and Bases** 1. Hydrolysis of water 2. Properties of acids and bases 3. Operational definitions a. The Arrhenius model b. The Brönsted-Lowry model c. The Lewis model 4. pH and pOH 5. Ionization constants (Ka, Kb, Kw) 6. Acid-base indicators 7. Neutralization 8. Titration 9. Naming acids and bases 10. Hydrolysis of aqueous salts 11. Acid-base properties of metallic and nonmetallic oxides
19	**Topic 10: Electrochemistry** 1. Nature of oxidation and reduction 2. Determining what is oxidized and what is reduced 3. Writing half reactions 4. Oxidation-reduction equations: a. Balancing by the half-reaction method b. Balancing by the ion-electron method 5. Using the activity series 6. Voltaic cells a. determining voltage 7. Electrolytic cells
20, 21	**Topic 11: Organic Chemistry** 1. Comparison of organic and inorganic compounds 2. Hydrocarbons and homologous series 3. Isomerism 4. Substituted hydrocarbons a. Organic oxygen compounds b. Organic nitrogen compounds 5. Reactions of organic compounds

Chapter	Topic
22	**Topic 12: Nuclear Chemistry** 1. Detection and measurement of radioactivity; half-life 2. Uses of radioisotopes 3. Induced nuclear reactions: fission and fusion