Course coverage in Dr. Lamp's CHEM 130

Chapter Sections	Key Concepts
Ch. 1: Matter	• Scientific Method • Problem solving • Unit conversions • Sig figs • Scientific notation • Physical and chemical properties and changes • Density
Ch. 2 (all): Atoms and Atomic Theory	• Atomic structure • Periodic table • Composition of matter • Ion formation • Isotopes • Atomic mass • Mole concept
Ch. 3 (All sections except 3-7): Chemical Compounds	• Compounds (ionic and molecular) o You should know all of the polyatomic ions in Table 3.5! o You should know the names and formulas of the oxoacids in Table 3.6. • Naming ionic compounds • Naming molecular compounds • Formula mass (molecular weight) • Percent composition • Combustion analysis • Empirical and molecular formulas
Ch. 4: Chemical Reactions	• Balancing chemical reactions • Stoichiometric calculations using balanced reactions • Mass to mole conversions (both ways) • Concentration units (such as molarity) • Concentration to mole conversion (both ways) • Dilution • Solution stoichiometry • Limiting Reactant • Theoretical Yield and Percent Yield
Ch. 5: Reactions in Aqueous Solution	• Classifying chemical reactions (precipitation, acid-base, redox…) • Net ionic equations • Electrolyte vs nonelectrolytes • Solubility guidelines • Definitions of acid an base • Strong versus weak acids and bases • Oxidation state (oxidation number) • Oxidation and reduction reactions • Balancing redox reactions in acidic or basic solution o Using half reactions • Identifying oxidizing and reducing agents • Titrations
Ch. 6: Gases	• Kinetic molecular theory • Pressure units and conversion • Gas laws (particularly combined gas law and ideal gas law) • Gas mixtures • Gas stoichiometry • Collection of gases over water • Considerations of "non-ideal" behavior
Ch. 7: Thermochemistry	• Concepts in thermodynamics (state functions, laws of thermo) • Heat capacity • Temperature

	• Work • Heats of Reaction • Calorimetry • Enthalpy • Hess' Law • Standard enthalpies of formation • Standard states

Ch. 19: Entropy and Gibbs Energy	• Spontaneity and the meaning of spontaneous change
	• Entropy
	• Evaluating entropy
	• Entropy changes
	• Laws of thermodynamics (particularly the second law of thermo)
	• Standard Gibbs energy change
	  o Criteria for spontaneous change in terms of the sign of ΔG, ΔH, and ΔS
	• Equilibrium
	• Entropies and free energies of formation
	  o Third law of thermodynamics
	• Gibbs energy at nonstandard conditions

Ch. 14: Kinetics	• Definition of rate of reaction
	• Relative rates for reactants and products based on stoichiometry
	• Measuring reaction rates
	• Rate law
	  o Differential rate law
	  o Integrated rate law
	  o Units of rate constants
	• Determining reaction order and rate constants from experiment
	  o Using the method of initial rates
	  o Using the integrated rate law
	• Half life
	• Using the isolation method to determine rate laws
	• Relating mechanisms to rate laws
	  o Elementary steps
	  o Evaluating whether a mechanism is reasonable based on a rate law.
	• Catalysis and the function of catalysts
	• Effect temperature on reaction rate
	  o Activation energy
	  o Arhennius equation

Chapter 15 Equilibrium	• What is means for a reaction to be an equilibrium • Equilibrium constant expressions (K_c and K_p) • Conversion between K_c and K_p • Relationship between ΔG and K • Using component equilibria to build new equilibria and find new equilibrium constants • Reaction quotient and predicting direction of change • Using ICE table to map out chemistry and determine equilibrium conditions. • LeChatelier's Principle an driving equilibria

Chapter 10:
(Sections 10.1-10.6)
Basic Bonding Concepts
	• Covalent bonding
	• Electronegativity
	• Bond polarity
	• Lewis dot structures
	  o "Octet Rule"
	• Formal charges
	• Resonance
	• Exceptions to the Octet Rule
	  o Odd-electron species
	  o Incomplete octets
	  o Expanded valence shells