CHEM 101 SYLLABUS

Text book: Raymond Chang, Chemistry, 10th edition, 2010

Topics	Text book pages	Number of Lecture
Matter and Measurements		
1.4 Classifications of Matter: substances and mixtures, elements and compounds. *How to right symbols of Elements (the table and the explanation (P 12)* **1.5** The Three States of Matter **1.6** Physical and Chemical properties of Matter: intensive and extensive properties **1.7** Measurement: SI units, mass and weight, volume, density, temperature scales **1.9** Dimensional Analysis in Solving Problems: conversion factors, a note on problem solving	**10 - 22** **27- 31**	**4**
Review and Exercises		
Atoms, Molecules and Ions		
2.2 The Structure of the Atoms: the electron, the proton and the neutron. *only definitions, masses, and charges* [Radioactivity is excluded] **2.3** Atomic Number, Mass Number and Isotopes **2.4** The Periodic Table *Periods and groups 1 to 18 - Metals and nonmetals - Alkaline, alkaline earth, halogens, and noble gases.* **2.5** Molecules and Ions: molecules, ions. *Diatomic molecules and polyatomic molecules - Homonuclear monatomic molecules, homonuclearmultiatomic molecules, and heteronuclear molecules (= Covalent compounds) - Ions (monatomic ions and polyatomic ions)* **2.7** Naming Compounds: ionic compound, molecular compound, acids and bases, familiar inorganic compound	**43 - 54** **59 - 68**	**5**
Review and Exercises		
Quantum Theory and the Electonic Structure of Atoms		
7.6 Quantum numbers. **7.7** Atomic Orbitals. **7.8** Electron Configuration.	**294 - 307**	**3**
Review and Exercises		
Periodic Relationships Among the Elements		
8.2 Periodic Classification of the elements. **8.3** Periodic Variation in Physical Properties (only atomic radius). **8.4** Ionization Energy. **8.5** Electron Affinity. (sections **8.4** and **8.5** can be confined only in properties without more details)	**326 – 332** **337 - 343**	**3**
Review and Exercises		

Stoichiometry and Chemical Equations		
3.1 Atomic Mass: average atomic mass **3.2** Avogadro's Number and the Molar Mass of an Element **3.3** Molecular Mass **3.5** Percent Composition of Compounds **3.6** Experimental Determination of Empirical Formulas: determination of molecular formulas **3.7** Chemical Reactions and Chemical Equations: writing chemical equations, balancing chemical equations **3.8** Amounts of reactants and products **3.9** Limiting Reagents **3.10** Reaction Yield	**80 – 87** **88 – 107**	**6**
Review and Exercises ***Mid Term Exam (30 Marks)***		
Gases		
5.1 Substances That Exist as Gases **5.2** Pressure of a Gas: SI units of pressure, atmospheric pressure. [Manometer is excluded] **5.3** The Gas Laws: the pressure-volume relationship: Boyle's Law, the temperature-volume relationship: Charles's and Gay-Lussac's law, the volume-amount relationship: Avogadro's Law **5.4** The Ideal Gas Equation: density calculation, the molar mass of a gaseous substance **5.5** Gas Stoichiometry **5.6** Dalton's law of Partial Pressures **5.7** The Kinetic Molecular Theory of Gases **5.8** Deviation from Ideal Behavior	**174 - 213**	**7**
Review and Exercises		
Thermochemistry		
6.3 Introduction to Thermodynamics: the first law of thermodynamics, work and heat **6.4** Enthalpy of Chemical Reactions: enthalpy of reactions, thermochemical equations, a comparison of ΔH and ΔE. **6.5** Calorimetry: **Only** specific heat and heat capacity **6.6** Standard Enthalpy of Formation and Reaction: the direct method, the indirect method. *The direct method (use of enthalpies of formation to calculate enthalpies of other reaction). The indirect method (Hess's law and its use to calculate enthalpies of other reaction)*	**233 - 238** **241 - 246** **252 - 258**	**5**
Review and Exercises		
Solutions		
12.1 Types of Solutions [Supersaturated solution is excluded] **12.2** A Molecular View of the Solution Process **4.5** Concentration of solution **12.3** Concentration Units: types of concentration units, comparison of concentration units *Molarity and dilution of solutions, Percent by mass, mole fraction, molarity* **12.4** The Effect of Temperature od Solubility: solid solubility and temperature, gas solubility and temperature [Fractional crystallization is excluded]	**514, 515** **147 – 150** **517 - 521** **521 - 525**	**7**

12.5 The Effect of Pressure on the Solubility of Gases **12.6** Colligative Properties of Nonelectrolyte Solutions: vapor-pressure lowering (Raoult's Law), boiling-point elevation, freezing-point depression, osmotic pressure, using colligative properties to determine molar mass [Fractional distillation is excluded]	**527, 528** **530 - 538**	
Review and Exercises		
TOTAL HOURS		**42**

Practical (30 Marks)

1.8 Handling Numbers: scientific notation, significant figures, accuracy and precision p22-27

Mid Term Exam:		**30 Marks**
Practical	**:**	**30 Marks**
Final Exam	**:**	**40 Marks**