

**Suggested Syllabus**  
**GENERAL CHEMISTRY 1**  
**(101 CHEM)**

**Textbook:** Raymond Chang, Chemistry, 10<sup>th</sup> edition, 2010

Topics	Textbook pages	Lecture hours
<b>Chapter 1: Matter and Measurements</b>		
<b>1.4</b> Classifications of Matter: substances and mixtures, elements and compounds <i>How to right symbols of Elements (the table and the explanation (P 12)</i>	<b>10-22</b>	<b>2</b>
<b>1.5</b> The Three States of Matter	<b>27-31</b>	
<b>1.6</b> Physical and Chemical properties of Matter: intensive and extensive properties		
<b>1.7</b> Measurement: SI units, mass and weight, volume, density, temperature scales		
<b>1.9</b> Dimensional Analysis in Solving Problems: conversion factors, a note on problem solving		
<i>Review and Exercises</i>		
<b>Chapter 2: Atoms, Molecules and Ions</b>		
<b>2.2</b> The Structure of the Atoms: the electron, the proton and the neutron <i>only definitions, masses, and charge [Radioactivity is excluded]</i>	<b>43-54</b>	<b>4</b>
<b>2.3</b> Atomic Number, Mass Number and Isotopes		
<b>2.4</b> The Periodic Table Periods and groups 1 to 18, Metals and nonmetals, Alkaline, Alkaline earth, Halogens, and Noble gases	<b>59-68</b>	
<b>2.5</b> Molecules and Ions: molecules, ions Diatomic molecules and polyatomic molecules - Homonuclear monatomic molecules, homonuclear multiatomic molecules, and heteronuclear molecules (Covalent compounds), Ions (monatomic ions and polyatomic ions)		
<b>2.6</b> Naming Compounds: ionic compound, molecular compound, acids and bases, familiar inorganic compound		
<i>Review and Exercises</i>		
<b>Chapter 7: Quantum Theory and the Electronic Structure of Atoms</b>		
<b>7.6</b> Quantum Numbers	<b>294-307</b>	<b>2</b>
<b>7.7</b> Atomic Orbitals		
<b>7.8</b> Electron Configuration		
<b>7.9</b> The Building-Up Principle		
<i>Review and Exercises</i>		
<b>Chapter 8: Periodic Relationships Among the Elements</b>		
<b>8.2</b> Periodic Classification of the elements	<b>326-332</b>	<b>2</b>
<b>8.3</b> Periodic Variation in Physical Properties (only atomic radius)	<b>337-343</b>	
<b>8.4</b> Ionization Energy		
<b>8.5</b> Electron Affinity Section <b>8.4</b> and <b>8.5</b> can be confined only in properties without more details		
<i>Review and Exercises</i>		

<b>Chapter 3: Stoichiometry and Chemical Equations</b>		
<b>3.1</b> Atomic Mass: average atomic mass <b>3.2</b> Avogadro's Number and the Molar Mass of an Element <b>3.3</b> Molecular Mass <b>3.5</b> Percent Composition of Compounds <b>3.6</b> Experimental Determination of Empirical Formulas: determination of molecular formulas <b>3.7</b> Chemical Reactions and Chemical Equations: writing chemical equations, balancing chemical equations <b>3.8</b> Amounts of Reactants and Products <b>3.9</b> Limiting Reagents <b>3.10</b> Reaction Yield	<b>80-107</b>	<b>5</b>
<b>Review and Exercises</b>		
<b>Chapter 5: Gases</b>		
<b>5.1</b> Substances That Exist as Gases <b>5.2</b> Pressure of a Gas: SI units of pressure, atmospheric pressure [Manometer is excluded] <b>5.3</b> 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 <b>5.4</b> The Ideal Gas Equation: density calculation, the molar mass of a gaseous substance <b>5.5</b> Gas Stoichiometry <b>5.6</b> Dalton's law of Partial Pressures <b>5.7</b> The Kinetic Molecular Theory of Gases <b>5.8</b> Deviation from Ideal Behavior	<b>174-213</b>	<b>5</b>
<b>Review and Exercises</b>		
<b>Chapter 6: Thermochemistry</b>		
<b>6.3</b> Introduction to Thermodynamics: the first law of thermodynamics, work and heat <b>6.4</b> Enthalpy of Chemical Reactions: enthalpy of reactions, thermochemical equations, a comparison of $\Delta H$ and $\Delta E$ <b>6.5</b> Calorimetry: <b>Only</b> specific heat and heat capacity <b>6.6</b> Standard Enthalpy of Formation and Reaction: the direct method, the indirect method. <i>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)</i>	<b>233-238</b>  <b>241-246</b>  <b>252-258</b>	<b>4</b>
<b>Review and Exercises</b>		
<b>Chapter 12: Physical Properties of Solutions</b>		
<b>12.1</b> Types of Solutions [Supersaturated solution is excluded] <b>12.2</b> A Molecular View of the Solution Process <b>4.5</b> Concentration of Solution <b>12.3</b> Concentration Units: types of concentration units, comparison of concentration units Molarity and dilution of solutions, Percent by mass, mole fraction, molarity <b>12.4</b> The Effect of Temperature on Solubility: solid solubility and temperature, gas solubility and temperature [Fractional crystallization is excluded] <b>12.5</b> The Effect of Pressure on the Solubility of Gases <b>12.6</b> 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]	<b>514-515</b>  <b>147-150</b> <b>517-525</b>  <b>521-225</b> <b>527-528</b>  <b>530-538</b>	<b>6</b>
<b>Review and Exercises</b>		
<b>TOTAL LECTURES</b>		<b>30</b>

**Practical:**

Handling Numbers: scientific notation, significant figures, accuracy and precision