



## DEPARTMENT OF SCIENCE

### CHEMISTRY 1010 A3 (Winter 2008)

<b>INSTRUCTOR:</b>	<b>Dr. Som K. Pillay</b> <b>(Office: J210/B301; Tel: 539-2985)</b>
<b>PREREQUISITE:</b>	<b>CHEM 30 or equivalent and</b> <b>MATH 30</b>
<b>TRANSFER CREDITS:</b>	<b>U. of Alberta: CHEM 101, 3 Credits</b> <b>U. Of Calgary: CHEM 201, 3 Credits</b>
<b>LECTURES:</b>	<b>Tuesdays &amp; Thursdays</b> <b>11:30 - 12:50 P.M. (J 203)</b>
<b>SEMINARS:</b>	<b>Mondays</b> <b>11:30 - 12:20 P.M. (J 203)</b>
<b>LABORATORY:</b>	<b>Wednesdays</b> <b>2:30 - 5:20 P.M. (J119)</b>
<b>TEXT BOOKS:</b>	<b>Steven S. Zumdahl and Susan A Zumdahl,</b> <b><i>Chemistry, Seventh Edition, Houghton Mifflin</i></b> <b>Company, 2007.</b>
<b>LABORATORY ITEMS:</b>	<b><i>Introductory University Chemistry Laboratory</i></b> <b><i>Manual, Chemistry 101, 2007 – 2008 Edition,</i></b> <b><i>Department of Chemistry, University of Alberta,</i></b> <b>2007.</b>
	<b>A Hard-Covered Laboratory Notebook, Lab Coats</b> <b>and Safety Glasses.</b>
<b>e-mail:</b>	<i>spillay@gprc.ab.ca</i> <b>OR</b> <i>kspillai@telusplanet.net</i>
<b>Web Pages:</b>	<i>http://blackboard.gprc.ab.ca/</i>



## ***COURSE EVALUATION***

### **THEORY:**

<i>Assignments/ Quizzes:</i>	<i>10.0 %</i>
<i>Mid-term Examinations:</i>	<i>25.0 %</i>
<i>Final Examination:</i>	<i><u>40.0 %</u></i>
	<i>75.0 %</i>

**Note:** *Students must obtain a minimum of 50 % in the theory Component to pass the course.  
There will be no supplemental or re-examination.*

### **LABORATORY:**

<i>General Competence in the Laboratory, Experimental Results, Lab and Reports:</i>	<i>15.0 %</i>
<i>Lab Exam:</i>	<i><u>10.0 %</u></i>
	<i>25.0 %</i>

**Note:** *Students must obtain a minimum of 50 % in the laboratory component to pass the course.*

<b><i>Descriptor</i></b>	<b><i>Grade</i></b>	<b><i>Points</i></b>	<b><i>Marks (%)</i></b>	<b><i>Descriptor</i></b>	<b><i>Grade</i></b>	<b><i>Points</i></b>	<b><i>Marks (%)</i></b>
<b><i>Excellent</i></b>	<i>A+</i>	<i>4.0</i>	<i>90-100</i>	<b><i>Satisfactory</i></b>	<i>C+</i>	<i>2.3</i>	<i>67-69</i>
	<i>A</i>	<i>4.0</i>	<i>85-89</i>		<i>C</i>	<i>2.0</i>	<i>64-66</i>
<b><i>First Class Standing</i></b>	<i>A-</i>	<i>3.7</i>	<i>80-84</i>		<i>C-</i>	<i>1.7</i>	<i>60-63</i>
	<i>B+</i>	<i>3.3</i>	<i>76-79</i>	<b><i>Minimal Pass</i></b>	<i>D+</i>	<i>1.3</i>	<i>55-59</i>
<b><i>Good</i></b>	<i>B</i>	<i>3.0</i>	<i>73-75</i>		<i>D</i>	<i>1.0</i>	<i>50-54</i>
	<i>B-</i>	<i>2.7</i>	<i>70-72</i>	<b><i>Fail</i></b>	<i>F</i>	<i>0</i>	<i>0-49</i>



## ***COURSE OUTLINE***

### **EMPHASIS IS PLACED ON UNDERSTANDING OF PRINCIPLES AND THE ABILITY TO USE PRINCIPLES TO SOLVE PROBLEMS.**

#### **1. REVIEW**

*Approximately two weeks of lectures and two weeks of seminars. The following chapters are relevant, and the material should be known from Chem 30.*

- Chapters:*
- 1. Chemical Foundations*
  - 2. Atoms, Molecules, and Ions*
  - 3. Stoichiometry*
  - 4. Types of Chemical Reactions and Solution Stoichiometry*
- Appendix*
- 1. Mathematical Procedures*

*Problem Set: 1*

#### **2. ATOMIC STRUCTURE AND PERIODICITY**

*Electromagnetic Radiation, Black Body Radiation, Photoelectric Effect, Bohr Model, Hydrogen Spectrum, The de Broglie Hypothesis, The Heisenberg Uncertainty Principle, Orbitals and Quantum Numbers, The Pauli Exclusion Principle, Hund's Rule, Electron Configuration, Periodic Properties.*

*Chapter: 7      Problem Set: 2*

#### **3. CHEMICAL BONDING AND MOLECULAR STRUCTURE**

*Ionic Bonds, Energetics of Ionic Crystals, Covalent Bonds, Electronegativity, Dipole Moments, Molecular Orbitals, Hybridization, Resonance, Lewis Structures, Molecular Geometry, Intermolecular Forces.*

*Chapters: 8 & 9      Problem Set: 3*



**4. PROPERTIES OF GASES**

*Ideal Gases, Dalton's Law of Partial Pressures, Kinetic Theory of Gases, Effusion and Diffusion, Van der Waals Equation of State, Critical Phenomena.*

*Chapter: 5; Problem Set: 4*

**5. LIQUIDS AND SOLIDS**

*Intermolecular Forces, The Liquid State, Vapour Pressure and Changes of State, Phase diagrams, Structure and Types of Solids, Structure and Bonding in Metals, Network Atomic Solids, Molecular Solids, and Ionic Solids.*

*Chapter: 10; Problem Sets: 5 & 6*

**6. CHEMISTRY OF THE ELEMENTS**

*Acids and Bases: Definitions, Nomenclature, structure and reactivity; Inorganic and Organic Acids.*

*Hydrogen, Alkali metals, Alkaline Earth metals, and p-Block Elements.*

*Chapters: 14, 19 & 20; Problem Set: 7*



## ***LECTURE SESSION***

*Regular attendance of lectures/seminars is essential to achieve a good understanding of the course material. You are encouraged to ask questions and to participate in class discussions. Help is also available outside the classroom. **NO APPOINTMENTS ARE NEEDED.***

### **TENTATIVE LECTURE SCHEDULE**

<b><i>WEEK OF</i></b>	<b><i>TUESDAYS</i></b>	<b><i>THURSDAYS</i></b>	<b><i>MONDAYS (Tutorial)</i></b>
<i>January 1</i>	-	<i>Introduction</i>	-
<i>7</i>	<i>Stoichiometry</i>	<i>Stoichiometry</i>	<i>Stoichiometry</i>
<i>14</i>	”	”	”
<i>21</i>	<i>Atomic Structure</i>	<i>Atomic Structure</i>	<i>Atomic Structure</i>
<i>28</i>	”	”	”
<i>February 4</i>	<i>Bonding &amp; Structure</i>	<i>Bonding &amp; Structure</i>	<i>Bonding &amp; Structure</i>
<i>11</i>	”	”	”
<i>18</i>	-	<b><i>Winter Break</i></b>	-
<i>25</i>	<i>Bonding &amp; Structure</i>	<i>Bonding &amp; Structure</i>	<i>Bonding &amp; Structure</i>
<i>March 3</i>	”	”	”
<i>10</i>	<i>Gases</i>	<i>Gases</i>	<i>Gases</i>
<i>17</i>	”	”	”
<i>24</i>	<i>Liquids and Solids</i>	<i>Liquids and Solids</i>	<i>Liquids and Solids</i>
<i>31</i>	”	”	”
<i>April 7</i>	<i>Representative elements</i>	<i>Representative elements</i>	<i>Representative elements</i>
<i>14</i>	*	<b><i>FINAL EXAM</i></b>	*



## ***READING AND PROBLEM ASSIGNMENTS***

*Problem solving is an essential part of this course. It will guide your study in the right direction and also will help you to monitor your performance in the course.*

*Approximately ten questions will be assigned as homework every week. However, you are encouraged to solve as many additional problems as you can. It is important that you work out these problems independently. Seek help with the ones you cannot solve yourself. Unless instructed otherwise, assignments are due on Mondays, Tuesdays, and Thursdays at 11:30 AM. **NO LATE ASSIGNMENTS ARE ACCEPTED. DON'T ASK!***

## ***LABORATORY SESSION***

*Laboratory sessions start at 2:30 P.M. sharp. All students are expected to come to the laboratory well prepared for the experiment that is to be performed and on time.*

*Students are expected to attend all laboratory periods. Absences due to illness must be substantiated by presenting suitable evidence to the Instructor/Lab Technician within one week of missing the lab. An opportunity to make up a lab will be given only for **excused absences**.*

*The laboratory experiments are designed to allow a well-prepared student to finish all the work within the allotted time. **IT IS YOUR RESPONSIBILITY TO COMPLETE THE LAB ON TIME.***

*Students are responsible for keeping the lab tidy. Failure to keep the workbench and common areas tidy will result in **demerits up to 5 marks** each lab period.*

### **LABORATORY REPORT**

*You must record everything you do and observe as you carry out your experiment. Use a hardcover laboratory notebook for this purpose. Do not copy the procedure from the laboratory manual. Keep your notebook neat. Your notebook will be checked periodically.*

*Formal lab reports should be written using the format given in your laboratory manual. The lab reports are due at the end of the lab. **NO LATE LAB REPORTS ARE ACCEPTED.***



**TENTATIVE LABORATORY SCHEDULE**

<b>WEEK OF</b>	<b>EXPERIMENT*</b>
<i>Jan. 9</i>	<i>Check-In: Lab and Safety Orientation</i>
<i>16</i>	<i>Stoichiometry and Reactions in Aqueous Solutions</i>
<i>23</i>	<i>Compounds of Copper</i>
<i>30</i>	<i>Hydrates</i>
<i>Feb. 6</i>	<i>Analysis of Vitamin C</i>
<i>13</i>	<i>Atoms and Line Spectra</i>
<i>20</i>	<b>* Winter Break *</b>
<i>27</i>	<i>Calorimetry</i>
<i>Mar. 5</i>	<i>Bonding and Chemical Properties</i>
<i>12</i>	<i>Qualitative Analysis</i>
<i>19</i>	<i>Lab Examination</i>
<i>26</i>	<i>Check-Out</i>

**\*TEXT:** *Introductory University Chemistry Laboratory Manual, Chemistry 101, 2007 – 2008 Edition, Department of Chemistry, University of Alberta, 2007.*