



## DEPARTMENT OF SCIENCE

### COURSE OUTLINE – FALL 2017

#### CH1030 INTRODUCTORY CHEMISTRY I – 4.3(3-1-3/2) 82.5 HOURS

**INSTRUCTOR:** Dr. Som Pillay

**OFFICE:** J210

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**OFFICE HOURS:** TBA

**PREREQUISITE(S):** Chemistry 30 or equivalent

**COREQUISITE(s):** MA1000

#### REQUIRED TEXT/RESOURCE MATERIALS:

Steven S. Zumdahl and Donald J. DeCoste, *Chemical Principles*, 8<sup>th</sup> edition, Books/Cole, Cengage Learning, 2016.

*Introductory University Chemistry Laboratory Manual, Chemistry 103*, 2017-2018 Edition, Department of Chemistry, University of Alberta, 2017.

A Hard-Covered Laboratory Notebook, Lab Coat, and Safety Glasses.

#### CALENDAR DESCRIPTION:

Basic chemical concepts, atomic and molecules structure, chemical bonding, behaviors of liquids, solids and gases. **Restricted to Engineering Students Only.**

#### DELIVERY MODE(S):

**LECTURES:** Mondays, Wednesdays, and Fridays  
10:30 AM – 11:20 A.M. (J228)

**SEMINARS:** Tuesdays and/or Thursdays  
1:00 – 1:50 P.M. (J202/J204)

**LABORATORY:** Wednesdays  
2:30-5:20 P.M. (J119)

**OBJECTIVES:**

This course enables students to strengthen their understanding of chemistry through the study of the structure, bonding, and reactivity of chemical substances. Students will further develop their problem-solving and critical thinking skills as they investigate chemical processes, and will refine their ability to communicate scientific information. Emphasis will be placed on understanding of basic principles and the ability to apply principles to solve problems.

**TRANSFERABILITY:**

University of Alberta: CHEM103 (4.3 Credits)

University of Calgary: ENGG201 (3 Credits)

**NOTE:** Grade of D or D+ is not an acceptable Grade for transfer to the above post-secondary institutions. It is the responsibility of the students to contact other receiving institutions to ensure transferability.

**GRADING CRITERIA:**

Descriptor	Grade	Points	Descriptor	Grade	Points
Excellent 84 – 100%	A+	4.0	Satisfactory 60 – 71 %	C+	2.3
	A	4.0		C	2.0
	A-	3.7		C-	1.7
Good 72 – 83 %	B+	3.3	Poor	D+	1.3
	B	3.0		D	1.0
	B-	2.7	Fail	F	0

**EVALUATIONS (THEORY):**

Assignments/Quizzes:	10.0%
Midterm Examination (Week of October 16):	25.0%
Final Examination (December 9-19):	50.0%

- Notes:**
1. Mid-term examination may be scheduled in the evenings or weekends.
  2. Students must obtain a minimum of 50 % in the theory Component to pass the course. There will be no supplemental or re-examination.

## **EVALUATIONS (LABORATORY):**

General Competence in the Laboratory,

Experimental Results, Lab Reports, and Prelab Assignments: 9.0%

Lab Exam: 6.0%

**Notes:** Students must obtain a minimum of 50 % in the Laboratory Component to pass the course.

## **STUDENT RESPONSIBILITIES:**

Refer to the College Policy on Student Rights and Responsibilities at [www.gprc.ab.ca/d/STUDENTRIGHTSRESPONSIBILITIES](http://www.gprc.ab.ca/d/STUDENTRIGHTSRESPONSIBILITIES)

All electronic equipment (cell phones, pagers, Walkman, A/V recorders etc., except calculators approved by the instructor) is to be turned off during class periods.

## **STATEMENT ON PLAGIARISM AND CHEATING:**

Refer to the College Student Misconduct: Academic and Non-Academic Policy at [www.gprc.ab.ca/d/STUDENTMISCONDUCT](http://www.gprc.ab.ca/d/STUDENTMISCONDUCT)

**\*\*Note:** all Academic and Administrative policies are available at [www.gprc.ab.ca/about/administration/policies/](http://www.gprc.ab.ca/about/administration/policies/)

## **COURSE SCHEDULE/TENTATIVE TIMELINE:**

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.

WEEK OF	MONDAY	WEDNESDAY	FRIDAY	Tuesday/Thursday (Tutorial)
Aug. 28	No Classes	Review	Review	Review
Sept. 4	No Classes	„	„	„
11	Review	„	Atomic Structure	Atomic Structure
18	Atomic Structure	Atomic Structure	„	„
25	„	„	Bonding & Structure	„
Oct. 2	Bonding & Structure	Bonding & Structure	„	Bonding & Structure
9	No Classes	„	„	„
16	Bonding & Structure	Midterm Exam	„	„
23	„	Bonding & Structure	„	„
30	„	Gases	Gases	Gases
Nov. 6	Gases	Gases	Fall Break	Gases/ Fall Break
13	Fall Break	Gases	Gases	Gases
20	Liquids and Solids	Liquids and Solids	Liquids and Solids	Liquids and Solids
27	Liquids and Solids	Liquids and Solids	Liquids and Solids	Liquids and Solids
Dec. 4	Chemistry of the Elements	Chemistry of the Elements	No Classes	Review
Dec. 11	FINAL EXAM	FINAL EXAM	FINAL EXAM	FINAL EXAM

## 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, Wednesdays, and Fridays at 10:00 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. Unless instructed otherwise, the lab reports are due on Fridays at 10:00 AM. NO LATE LAB REPORTS ARE ACCEPTED.

### **TENTATIVE LABORATORY SCHEDULE**

<b>Date</b>	<b>EXPERIMENT<sup>*</sup></b>
Sept. 6 & 13	A. <a href="#">Check-In: Lab and Safety Orientation</a>
Sept. 20 & 27	B. <a href="#">Stoichiometry</a>
Oct. 04 & 11	C. <a href="#">Compounds of Copper</a>
Oct. 18 & 25	F. <a href="#">Analysis of Vitamin C</a>
Nov. 1 & 8	I. <a href="#">Bonding &amp; Chemical Properties</a>
Nov. 16 & 22	L. <a href="#">Lab Exam and Check-Out</a>

\*TEXT: Chemistry 103, Laboratory Experiments, 2017 – 20018 Edition, University of Alberta, 2017.

## **COURSE SYLLABUS (CONTENT):**

### **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:                2. Atoms, Molecules, and Ions  
                              3. Stoichiometry  
                              4. Types of Chemical Reactions and Solution Stoichiometry

Appendix                1. Mathematical Procedures  
                              2. Units of Measurement

Problem Set: 1

### **2. QUANTUM THEORY AND ATOMIC STRUCTURE**

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

Chapter: 12,   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: 13 & 14,   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; Structures, Properties, and Bonding; Changes of State; Phase diagrams.

Chapter: 16;   Problem Set: 5

### **6. CHEMISTRY OF THE ELEMENTS**

Acids and Bases: Definitions, Nomenclature, structure and reactivity; Inorganic and Organic Acids. The Representative Elements and Transition Metals.

Chapters: 7, 18 & 19; Problem Set: 6