



DEPARTMENT OF SCIENCE

COURSE OUTLINE – FALL 2015

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

INSTRUCTOR: Dr. Som Pillay

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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*, 7th edition, Books/Cole, Cengage Learning, 2013.

Introductory University Chemistry Laboratory Manual, Chemistry 103, 2015-2016 Edition, Department of Chemistry, University of Alberta, 2015.

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. (J228)

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.

LEARNING OUTCOMES:

Students will be able to critically analyze and solve problems in chemical sciences. They will acquire the ability to predict physical and chemical properties of substances based on their structures. The students will acquire sufficient background knowledge to proceed to higher studies in related fields.

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 21):	25.0%
Final Examination (Week of December 12):	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

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

****Note:** all Academic and Administrative policies are available at 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. 31	No Classes	Review	Review	Review
7	No Classes	„	„	„
14	Review	„	Atomic Structure	Atomic Structure
21	Atomic Structure	Atomic Structure	„	„
28	„	„	Bonding & Structure	„
Oct. 5	Bonding & Structure	Bonding & Structure	„	Bonding & Structure
12	No Classes	„	„	„
19	Bonding & Structure	Midterm Exam	„	„
26	„	Bonding & Structure	„	„
Nov. 2	„	Gases	Gases	Gases
9	Gases	Fall Break	Fall Break	Gases/ Fall Break
16	Gases	Gases	Gases	Gases
23	Liquids and Solids	Liquids and Solids	Liquids and Solids	Liquids and Solids
30	Liquids and Solids	Chemistry of the Elements	Chemistry of the Elements	Liquids and Solids
Dec. 7	Review	No Classes	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

Date	EXPERIMENT [*]
Sept. 9 & 16	A. Check-In: Lab and Safety Orientation
Sept. 23 & 30	B. Stoichiometry
Oct. 07 & 14	C. Compounds of Copper
Oct. 21 & 28	F. Analysis of Vitamin C
Nov. 4 & 18	I. Bonding & Chemical Properties
Nov. 25 & Dec. 2	L. Lab Exam and Check-Out

*TEXT: Chemistry 103, Laboratory Experiments, 2015 – 2016 Edition,
University of Alberta, 2015.

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