DEPARTMENT OF SCIENCE

COURSE OUTLINE – FALL 2018

CH1030 A2: Introductory University Chemistry I – 4.3(3-1-1.5)

82.5 Hours over 15 weeks

INSTRUCTOR: Les Rawluk **PHONE:** 780 539 2738
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OFFICE HOURS: By appointment, or walk-in as needed

CALENDAR DESCRIPTION: Basic chemical concepts, atomic and molecules structure, chemical bonding, behaviours of liquids, solids, and gases. **Restricted to Engineering students.**

PREREQUISITE(S)/COREQUISITE: Chemistry 30 or equivalent

REQUIRED TEXT/RESOURCE MATERIALS: *Chemical Principles* by Steven S. Zumdahl and Donald J. DeCoste, 8th edition, Brooks/Cole, Cengage Learning, 2016

Introductory University Chemistry I (Chem 101 and 103) Laboratory Manual, published by the University of Alberta, 2018/2019 edition, available for purchase at the GPRC Bookstore.

DELIVERY MODE(S): Lecture style presentation of material followed by practice problems/discussion in seminar. Laboratory provides hands-on experience.

COURSE 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 these principles to solve problems.

LEARNING OUTCOMES: Students will use their introduction to quantum mechanics to describe the Hydrogen atom. They will extend this knowledge to a multi-electron atom, followed by predicting trends in atomic properties as related to atomic position on the periodic table. Students will identify valence electrons, and examine their role in ionic, covalent, and polar covalent bonding. Valence electron role in the 3-D shape of molecules will be explored, and students will be able to predict molecular properties such as melting and boiling point trends, polarity, and viscosity. Students will interpret intermolecular forces for a variety of molecules, and link these forces to the solid, liquid, and vapor states. Students will observe and describe trends in main group element chemistry throughout the course.

TRANSFERABILITY: CH1030 transfers to **UA, UC, UL, AU, AF, CU, CUC, KUC.**

***Warning:** Although we strive to make the transferability information in this document up-to-date and accurate, **the student has the final responsibility for ensuring the transferability of this course to Alberta Colleges and Universities**. Please consult the Alberta Transfer Guide for more information. You may check to ensure the transferability of this course at Alberta Transfer Guide main page http://www.transferalberta.ca or, if you do not want to navigate through few links, at http://alis.alberta.ca/ps/tsp/ta/tbi/onlinesearch.html?SearchMode=S&step=2

** Grade of D or D+ may not be acceptable for transfer to other post-secondary institutions. **Students are cautioned that it is their responsibility to contact the receiving institutions to ensure transferability**

EVALUATIONS:		
	Quizzes	5%
	Lab Reports	10%
	Lab Exam	10%
	Midterm	25%
	Final Exam	50%

GRADING CRITERIA:

Alpha Grade	4-point Equivalent	Percentage Guidelines		Alpha Grade	4-point Equivalent	Percentage Guidelines
A+	4.0	94-100		C+	2.3	68-71
A	4.0	89-93		C	2.0	64-67
A-	3.7	84-88		C-	1.7	60-63
B+	3.3	80-83		D+	1.3	55-59
B	3.0	76-79		D	1.0	50-54
B-	2.7	72-75		F	0.0	00-49

COURSE SCHEDULE/TENTATIVE TIMELINE:

Matter and Stoichiometry (Chapters 1, 2, 3, 4; Pages 1 – 127) *2 – 3 lectures*

- Units, dimensional analysis
- Periodic table
- Naming simple compounds
- The mole
- Empirical and molecular formula of a compound
- Calculations involving a limiting reagent
- Aqueous solutions and molarity
- Precipitation, acid/base, redox reactions

Atomic Theory (Chapter 12; Page 436 – 497) *6 – 7 lectures*

- Introduction to Atomic Structure
- Electromagnetic radiation
- Atomic spectra and the Bohr model
- Quantum mechanics and the atom
- Orbital shapes and energies
- Many-electron atoms
- Building of the periodic table
- Trends in atomic properties

Chemical Bonding (Chapters 13 and 14; Pages 498 – 578) *6 – 7 lectures*

- Types of chemical bonds and electronegativity
- Ionic bonding
- Lattice energy
- Covalent bonding
- Bond energies and chemical reactions
- Lewis structures; octet rule; resonance, formal charge, exceptions
- VSEPR theory and molecular shape
- Hybridization
- Molecular orbital theory

States of Matter (Chapters 5 and 16; Pages 128 – 168 and Pages 648 – 685) 5 – *6 lectures*

- Intermolecular forces
- Gases
- Liquids, solutions
- Solids
- Changes of state, phase diagrams

Chemistry of the Main Group Elements (Chapter 18; Pages 734 – 774) *1 – 2 lectures*

- Periodicity
- Properties of Representative Metals
- Properties of the Metalloids
- Properties of the Nonmetals

STUDENT RESPONSIBILITIES:

A student must pass the laboratory portion to receive a passing grade in this course.

Assignments will be electronically distributed on a roughly weekly basis. Complete solutions will be available a short while later. Solutions to quizzes will be posted a few days after the quiz is completed.

Attendance to all lectures and seminars is strongly recommended. Laboratory attendance to each specific experiment is compulsory. A doctor's medical note is required for all excused absences.

Students must maintain an overall average of 50% or better to pass this course. You are encouraged to participate in class discussions and ask questions. Help is available outside the classroom on an "as needed" basis.

STATEMENT ON PLAGIARISM AND CHEATING:

Cheating and plagiarism will not be tolerated and there will be penalties. For a more precise definition of plagiarism and its consequences, refer to the Student Conduct section of the College Admission Guide at http://www.gprc.ab.ca/programs/calendar/ or the College Policy on Student Misconduct: Plagiarism and Cheating at http://www.gprc.ab.ca/about/administration/policies/

**Note: all Academic and Administrative policies are available on the same page.