



**DEPARTMENT OF SCIENCE**  
**COURSE OUTLINE – WINTER 2021**  
**CH1010 (A3): Introductory University Chemistry I – 3(3-1-3)**  
**105 Hours over 15 weeks**

**INSTRUCTOR:** Les Rawluk

**PHONE:** 780 539 2738

**OFFICE:** J214

**EMAIL:** lrawluk@gprc.ab.ca

**OFFICE HOURS:** Appointment, email, or Zoom as needed

**WINTER 2021 DELIVERY:** Mixed Delivery – Remote and Onsite. This course is delivered remotely with some face-to-face/onsite components at the GPRC Grande Prairie campus.

- For the remote delivery components: students must have a computer with a webcam and reliable internet connection. Technological support is available through [helpdesk@gprc.ab.ca](mailto:helpdesk@gprc.ab.ca).

For the onsite components: students must supply their own mask [and/or face shield] and follow GPRC Campus Access Guidelines and Expectations

(<https://www.gprc.ab.ca/doc.php?d=ACCESSGUIDE>).

Note: GPRC reserves the right to change the course delivery.

**CALENDAR DESCRIPTION:** Lectures include stoichiometry, atomic structure and bonding, states of matter and intermolecular forces, chemistry of the elements.

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

**REQUIRED TEXT/RESOURCE MATERIALS:** Recommended textbook is Chemistry 2<sup>nd</sup> Edition by OpenStax. This is an Open Educational Resource available at no charge; the required Lab manual is Introductory University Chemistry I (Chem 101 and 103), published by the University of Alberta, 2019/2020 edition.

**DELIVERY MODE(S):** Presentation of lecture material supplemented by practice problems during seminar will occur via remote delivery. Chemistry experiments provide practical hands-on experience; laboratory work will occur on-site at the Chemistry laboratories (J116 or J119). The dates and of these onsite components can be found on the myClass website for CH1010.

**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 the 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:** Please consult the Alberta Transfer Guide for more information. You may check to ensure the transferability of this course at the Alberta Transfer Guide main page <http://www.transferralberta.ca>.

\*\* 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**

<b>EVALUATIONS:</b>	October Midterm	17%
	November Midterm	17%
	Quizzes	9%
	Lab Reports	12%
	Lab Exam	10%
	Final Exam	35%

## GRADING CRITERIA:

Alpha Grade	4-point Equivalent	Percentage Guidelines	Alpha Grade	4-point Equivalent	Percentage Guidelines
A+	4.0	90-100	C+	2.3	67-69
A	4.0	85-89	C	2.0	63-66
A-	3.7	80-84	C-	1.7	60-62
B+	3.3	77-79	D+	1.3	55-59
B	3.0	73-76	D	1.0	50-54
B-	2.7	70-72	F	0.0	00-49

## COURSE SCHEDULE/TENTATIVE TIMELINE:

Matter and Stoichiometry (Chapters 1, 2, 3, 4; Pages 9 – 229) *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 Structure (Chapters 2 and 6; Pages 79 – 87 and Pages 281 – 341) *6 – 8 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 7 and 8; Pages 343 – 455) *6 – 8 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 9 and 10; Pages 457 – 519 and Pages 521 – 598) *4 – 6 lectures*

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

Chemistry of the Main Group Elements (Chapter 18; Pages 941 – 1027) *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. A “repeat” final exam is not available 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 class time 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.