

CHEM 101A – Introductory University Chemistry I

3 credits, 4 hours lecture, 3 hours lab

Course description: Atoms and molecules, states of matter, chemistry of the elements, relevance and uses of elements and compounds.

Prerequisite: CHEM 30 or equivalent.

Instructor

Dr. Sorin Nita

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Office Hours

Monday	2:00 PM – 4:00 PM
Thursday	10:00 AM – 12:00 PM
Friday	11:00 AM – 12:00 PM

Hours of Instruction

Lecture:	Monday	4:00 PM – 5:00 PM	Room 273
	Thursday	1:00 PM – 2:00 PM	Room 273
	Friday	9:00 AM – 11:00 AM	Room 228
Laboratory:	Tuesday	9:00 AM – 12:00 PM	Chem 101X - Lab 236
	Tuesday	2:00 PM – 5:00 PM	Chem 101Y - Lab 236
	Wednesday	9:00 AM – 12:00 PM	Chem 101Z - Lab 236

Required Resources

1. **General Chemistry: Principles & Modern Applications**; Petrucci, Herring, Madura, Bissonnette; Pearson Canada Inc., Toronto, Ontario, 2017, 11th edition, ISBN 978-0-13-293128-1.
The 10th edition of this textbook is also acceptable.
2. **Chemistry 101/103 Laboratory Manual**; Keyano College, 2016/2017 edition.
The old editions of the lab manual are not acceptable.
3. **Student Lab Notebook with Permanent Binding**; Hayden-McNeil, Plymouth, Michigan, ISBN 978-1-930882-00-3
4. A non-programmable scientific calculator (Sharp EL-531, used for exams, is recommended).
5. Extra long lab coat.

Course Outcomes

Upon successful completion of the course, student will be able to:

- Perform chemical experiments using laboratory equipment, and apply safety procedures to ensure a safe working environment for oneself and co-workers

- Summarize various atomic models and explain the modern approach towards atomic structure (quantum mechanical atom)
- Describe electronic configurations and correlate the chemical properties of elements with their electronic structure
- Analyze chemical compounds using various chemical bonding theories and predict their molecular structure (VSEPR), hybridization (Valence Bond Theory) and electronic diagrams (Molecular Orbital Theory)
- Analyze acid-base and redox reactions, balance chemical equations, and perform stoichiometry calculations

Evaluation

Assignments	10%
Laboratory	25%
Midterm 1 Exam	6%
Midterm 2 Exam	14%
Final Exam	45%
Total	100%

A grade of C- is required for progression or transfer.

Grading System

Descriptor	Alpha Grade	4.0 Scale	Percent	Rubric for Letter Grades
Excellent	A+	4.0	> 92.9	Work shows in-depth and critical analysis, well developed ideas, creativity, excellent writing, clarity and proper format.
	A	4.0	85 – 92.9	
	A-	3.7	80 – 84.9	
Good	B+	3.3	77 – 79.9	Work is generally of high quality, well developed, well written, has clarity, and uses proper format.
	B	3.0	74 – 76.9	
	B-	2.7	70 – 73.9	
Satisfactory Progression	C+	2.3	67 – 69.9	Work has some developed ideas but needs more attention to clarity, style and formatting.
	C	2.0	64 – 66.9	
	C-	1.7	60 – 63.9	
Poor Minimum Pass	D+	1.3	55 – 59.9	Work is completed in a general way with minimal support, or is poorly written or did not use proper format.
	D	1.0	50 – 54.9	
Failure	F	0.0	< 50	Responses fail to demonstrate appropriate understanding or are fundamentally incomplete.

Proposed Schedule of Topics

1. ATOMIC STRUCTURE

textbook chapters

- | | |
|---|---------------|
| • Nature of light, atomic spectra, Bohr model of atom | 8.1-8.4 |
| • Nature of matter, quantum mechanical model of atom | 8.5-8.6 |
| • Shapes and energies of hydrogen orbitals, electron spin | 8.7-8.11 |
| • Periodic table, trends in atomic properties (sizes, IE, EA) | 8.12, 9.1-9.6 |
| • Periodic properties of elements | 9.7 |

2. CHEMICAL BONDING

- Lewis structures, polar bonds, electronegativity, formal charges 10.1-10.4
- Resonance, octet rule exceptions 10.5-10.6
- VSEPR and molecular structure 10.7-10.9
- Valence bond theory, hybridization, multiple bonding 11.1-11.4
- Molecular orbital theory, bonding in metals 11.5-11.7

3. STATES OF MATTER

- Relation of gases, liquids, solids with intermolecular forces 12.1
- Ideal gases, mixtures of gases, partial pressures, Dalton's law 6.1-6.6
- Kinetic molecular theory, real gases 6.7-6.9
- Properties of liquids and solids 12.2-12.3, 12.5-12.2
- Phase diagrams 12.4

4. CHEMISTRY OF THE ELEMENTS

- Bonding, metal vs. nonmetals, acids and bases, redox, physical states 5.1-5.3
- Acids and bases 16.1-16.9
 - Definitions: Arrhenius, Brønsted-Lowry, Lewis
 - Molecular structure and acid-base behavior
- Oxidizing and reducing agents 5.4-5.7

Please Note:

Date and time allotted to each topic is subject to change.

Performance Requirements**Student Responsibilities**

It is your responsibility as a student to contact the Office of the Registrar to complete the forms for Withdrawal or Change of Registration, and any other forms. Please refer to the list of important dates as noted in the Academic Schedule in the Keyano College credit calendar.

More specific details are found in the Student Rights and Student Code of Conduct section of the Keyano College credit calendar. It is the responsibility of each student to be aware of the guidelines outlined in the Student Rights and Student Code of Conduct Policies.

Laboratory Safety

In the science laboratories, safety is important.

Students must complete the *WHMIS for Students* online training course on Moodle before entering the science laboratories.

Students must comply with the mandatory laboratory safety rules for this course as provided in the laboratory manual. Failure to do so will result in progressive discipline such as a verbal warning, refused entry into the laboratory, or suspension from the College.

Student Attendance

Class attendance is useful for two reasons. First, class attendance maximizes a student's learning experience. Second, attending class is a good way to keep informed of matters relating the

administration of the course (e.g., the timing of assignments and exams). Ultimately, you are responsible for your own learning and performance in this course.

Students are required to attend and complete all labs. *Unexcused absence from any lab period or failure to submit a lab report may result in a failing grade in the course. If a lab is missed for a valid reason, a makeup lab may be attended to complete the work.*

It is the responsibility of each student to be prepared for all classes. Students who miss classes are responsible for the material covered in those classes and for ensuring that they are prepared for the next class, including the completion of any assignments and / or notes that may be due.

Academic Misconduct

Students are considered to be responsible adults and should adhere to principles of intellectual integrity. Intellectual dishonesty may take many forms, such as:

- Plagiarism or the submission of another person's work as one's own
- The use of unauthorized aids in assignments or examinations (cheating)
- Collusion or the unauthorized collaboration with others in preparing work
- The deliberate misrepresentation of qualifications
- The willful distortion of results or data
- Substitution in an examination by another person
- Handing in the same unchanged work as submitted for another assignment
- Breach of confidentiality.

The consequences for academic misconduct range from a verbal reprimand to expulsion from the College. More specific descriptions and details are found in the Student Rights and Student Code of Conduct section of the Keyano College credit calendar. It is the responsibility of each student to be aware of the guidelines outlined in the Student Rights and Student Code of Conduct Policies.

In order to ensure your understanding of the concept of plagiarism, you must successfully complete the online tutorial found on ilearn.keyano.ca. Then print the certificate, sign it, and show it to each of your instructors. Your course work will not be graded until you show this signed certificate.

Specialized Supports

Counselling and Disability Services

Counselling Services provides a wide range of specialized counselling services to prospective and registered students, including personal, career and academic counselling.

SKILL Centre

The SKILL Centre is a learning space in the Clearwater Campus at Keyano College where students can gather to share ideas, collaborate on projects and get new perspectives on learning from our tutorial staff.

The SKILL Centre, through a variety of delivery methods, provides assistance in skill development to Keyano students. Assistance is provided by instructors, staff and student tutors. Individuals wishing to improve their mathematics, writing, grammar, study, or other skills, can take advantage of this unique service.

Authorization

This course outline has been reviewed and approved by the Program Chair.

Sorin Nita, Instructor

Louis Dingley, Chair

Date Authorized

Guy Harmer, Dean

Date Authorized

Signed copies to be delivered to:

Instructor

Registrar's Office