

CHEM 103A – Introductory University Chemistry I

3 credits, 4 hours lecture, 3 hours lab every second week

4.3 Engineering units for the University of Alberta

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

Prerequisite: CHEM 30 or equivalent.

NOTE: Chemistry 103 is restricted to Engineering students only

Instructor

Dr. Sorin Nita

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Office Hours

Monday 10:00 AM – 12:00 PM

Monday 2:00 PM – 2:00 PM

Wednesday 2:00 PM – 3:00 PM

Friday 2:00 AM – 3:00 AM

Hours of Instruction

Lecture:	Monday	1:00 PM – 2:00 PM	Room 273
	Wednesday	1:00 PM – 2:00 PM	Room 273
	Friday	10:00 AM – 12:00 PM	Room 273

Laboratory:	Thursday	2:00 PM – 5:00 PM	Chem 103X - Lab 236
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Required Resources

- General Chemistry: Principles & Modern Applications with Modified Mastering Chemistry;** Petrucci, Herring, Madura, Bissonnette; Pearson Canada Inc., Toronto, Ontario, 2017, 11th edition. *The 10th edition of this textbook is also acceptable.*
 - ISBN 978-0-13-389734-0: eText + Modified Mastering Chemistry; *or*
 - ISBN 978-0-13-409732-9: Printed Textbook + eText + Mastering Chemistry.
- Alternative Open Source Textbook: Chemistry 2e;** Flowers, Theopold, Langley, Robinson; OpenStax, 2019, ISBN 978-1-947172-61-6.
Download for free at <https://openstax.org/details/books/chemistry-2e>
- Chemistry 101/103 Laboratory Manual;** Keyano College, 2020/2021 edition.
The old editions of the lab manual are not acceptable.
- Student Lab Notebook with Permanent Binding;** Hayden-McNeil, Plymouth, Michigan, ISBN 978-1-930882-00-3
- A non-programmable scientific calculator (Sharp EL-531, used for exams, is recommended).
- Extra-long lab coat.

Course Outcomes

Upon successful completion of this course, the student shall 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 Exams	20%
Final Exam	45%
Total	100%

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

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.

Grading System

Descriptor	Alpha Grade	4.0 Scale	Percent
	A+	4.0	> 93.9
Excellent	A	4.0	87 – 93.9
	A-	3.7	80 – 86.9
Good	B+	3.3	77 – 79.9
	B	3.0	74 – 76.9
	B-	2.7	70 – 73.9
Satisfactory	C+	2.3	67 – 69.9
	C	2.0	64 – 66.9
Progression	C-	1.7	60 – 63.9
Poor	D+	1.3	57 – 59.9
Min Pass	D	1.0	50 – 56.9
Failure	F	0.0	< 50

Proposed Schedule of Topics

	textbook chapters
1. ATOMIC STRUCTURE	
• 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)	9.1-9.6
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	11.5-11.6
3. STATES OF MATTER	
• Ideal gases, mixtures of gases, partial pressures, Dalton's law	6.1-6.6
• Kinetic molecular theory, real gases	6.7-6.9
• Relation of gases, liquids, solids with intermolecular forces	12.1
• Properties of liquids and solids	12.2-12.3
• Phase diagrams	12.4
• Crystal structures	12.5-12.6
4. SOLUTION STOICHIOMETRY	
• Aqueous solutions, precipitation reactions	5.1-5.2
• Acid-base reactions, Arrhenius definition	5.3
• Redox reactions, 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](#). The Keyano College credit calendar also has information about Student Rights and Code of Conduct. It is the responsibility of each student to be aware of the guidelines outlined in the Student Rights and 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.

Before entering the lab, students are responsible reviewing the lab manual and relevant Safety Data Sheets for the purpose of evaluating risks associated to health. Some hazards used in the laboratory may have additional risks to those with pre-existing medical conditions.

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 to 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.

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 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; and
- 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 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 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 may not be graded until you show this signed certificate.

Specialized Supports

The Student Services department is committed to Keyano students and their academic success. There are a variety of student supports available at Keyano College. Due to the continuing situation with the Covid-19 pandemic, the offered support services will be implemented differently this semester by being provided mostly virtually. In-person service can be requested as needed. All Alberta Health Services guidelines will be followed for in-person appointments—wear a mask, maintain two meters of physical distance, use hand sanitizer, and stay home if you are unwell.

All student services are available during Keyano business hours: Monday to Friday, 8h30-16h30. The Library has evening and weekend hours. Please check keyano.ca/library for current hours.

Accessibility Services: provides accommodations for students with disabilities. Students with documented disabilities, or who suspect a disability, can meet with a Learning Strategist to discuss their current learning barriers and possible accommodations. Students who have accessed

accommodations in the past are encouraged to contact us to request them for the semester. Please note that requesting accommodations is a process and requires time to arrange. Contact us as soon as you know you may require accommodations. For accessibility services supports and to book a virtual appointment, please contact accessibility.services@keyano.ca.

Accessibility Services also provides individual and group learning strategy instruction for all students, as well as technology training and supports to enhance learning. Meet with a Learning Strategist to learn studying and test-taking strategies for online classes. Schedule an appointment with the Assistive Technology Specialist to explore technology tools for learning. Book an appointment today by emailing accessibility.services@keyano.ca

Academic Success Coaching: offers you support and access to resources for your academic success to help you to find the Keys to your Success. The Academic Success Coach will work with you to develop an academic success plan, develop your study and time management skills, and connect you with the right resources here at Keyano. Academic.success@keyano.ca is the best way to access resources during virtual service delivery.

Wellness Services: offers a caring, inclusive, and respectful environment where students can access free group and individual support to meet academic and life challenges. Mental Health Coordinators offer a safe and confidential environment to seek help with personal concerns. All individual appointments will continue virtually.

Wellness Services welcomes students to participate in any of the virtual group sessions offered throughout the academic year addressing topics including mindfulness and test anxiety.

Individual virtual appointments can be made by emailing wellness.services@keyano.ca.

Library Services: provides students with research and information supports as they engage in their studies. Library staff are available to support you both virtually and in person during the fall semester. For library service supports and inquiries, please email askthelibrary@keyano.ca.

[Individual support with the Information Librarian will be provided virtually. Appointments can be requested by email or by placing a Book a Librarian request](#) using the online form found [here](#).

Research and Subject Guides are helpful resources when conducting research or addressing your information needs. To view a subject or course specific guide, use the following [Subject Guides link](#)

To access additional research resources, including Citation Guides (APA, MLA, Chicago, or IEEE), go to the [Research Help Library page](#).

Skill Centre: provides academic support services to students registered in credit programs at Keyano College in the form of tutoring, writing support groups, facilitated study groups, workshops and study space. Tutoring services are **free** to Keyano students. Tutoring is available for Math, Writing, English, and Science subject areas.

While most courses are being offered online, the Skill Center will be offering mostly virtual tutoring services and in-person sessions as requested. Please email Skill.centre@keyano.ca to get in contact with our tutoring staff.

For the most up to date information on how to book a tutoring session, please view the [Keyano Skill Centre homepage](#).

E-Learning

Technology and internet will impact your online learning experience. It's important that you are able to watch an online video and other course materials, take online quizzes, and participant in a live class with your instructor and other students.

Keyano College operates in a Windows based environment and having the correct tools for online learning is important. Here's a list of recommended system requirements for Fall 2020.

Internet Speed

Minimum Internet speeds of 5 Mbps.
Recommended Internet speeds of 25 Mbps (especially if you are sharing your internet at home).
Check your internet speed with Fast.com.

System requirements:

Microsoft Windows	Apple
<p>Minimum Requirements:</p> <p>A Windows 10 computer/laptop</p> <ul style="list-style-type: none"> · Minimum 4GB of RAM. · 10GB+ available hard drive storage. · Enough available hard drive space to install the Microsoft Office suite (approximately 3GB). Microsoft Office software is free to all Keyano students and employees. · Microphone, webcam and speakers. A headset with a microphone is recommended. · System updates must be regularly installed. · Anti-Virus / Anti-Malware software 	<p>Minimum Requirements:</p> <p>A Macintosh (V10.14 and above) computer/laptop</p> <ul style="list-style-type: none"> · Minimum 4GB of RAM. · 10GB+ available hard drive storage. · Enough available hard drive space to install the Microsoft Office suite (approximately 3GB). Microsoft Office software is free to all Keyano students and employees. · Microphone, webcam and speakers. A headset with a microphone is recommended. · System updates must be regularly installed. · Anti-Virus / Anti-Malware software.

<p>Recommended Requirements</p> <ul style="list-style-type: none">· 8GB of RAM· A method of backing up/synchronizing to local or cloud-based storage such as OneDrive is highly recommended. This is included if you complete the setup of KeyanoMail and download MS Office using your Keyano email for free.	<p>Recommended Requirements</p> <ul style="list-style-type: none">· 8GB of RAM· A method of backing up/synchronizing to local or cloud-based storage such as OneDrive is highly recommended. This is included if you complete the setup of KeyanoMail and download MS Office using your Keyano email for free.
<p>Chromebooks are not recommended as they are not compatible with testing lockdown browsers.</p> <p>A Microsoft Surface or iPad or iPad Pro may be possible alternatives in some program areas.</p>	

Specific department requirements:

Business and OA programs require Windows 10.

Other programs may utilize Windows based tools as well.

Computer Software

Students will be able to get access to Microsoft Office 365 for Free using Keyano Credentials by [clicking here](#).

Recording of lectures and Intellectual Property

Students may only record a lecture if explicit permission is provided by the instructor or by Accessibility Services. Even if students have permission to record a lecture or lecture materials, students may not publish any of the lectures or lecture materials, this includes any recordings, slides, instructor notes, etc. on any platform. Thus no student is allowed to publish or sell instructor notes without formal written permission. It is important to recognize that the Canadian Copyright Act contains provisions for intellectual property.

ITS Helpdesk

If you are having issues with your student account, you can contact the ITS Helpdesk by emailing its.helpdesk@keyano.ca or calling 780-791-4965.