Course Outline

University Studies

Winter 2021

CHEMISTRY 105 – Introductory University Chemistry II
3 credits, 4 hours lecture, 3 hours lab every second week
3.8 Engineering units for the University of Alberta

Rates of reactions, thermodynamics and equilibrium, electrochemistry and modern applications of chemistry.

Prerequisite: CHEM 103

NOTE: Chemistry 103 is restricted to Engineering students only

Instructor

Dr. Sorin Nita

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Office Hours

Monday	2:00 PM – 3:00 PM
Wednesday	2:00 PM – 3:00 PM
Thursday	2:00 PM – 4:00 PM
Friday	2:00 AM – 3:00 AM

Hours of Instruction

Lecture:	Monday	1:00 PM – 2:00 PM	Room 205
	Wednesday	1:00 PM – 2:00 PM	Room 205
	Friday	10:00 AM – 12:00 PM	Room 205
Laboratory:	Tuesday	2:00 PM – 4:00 PM	Lab 236

Required Resources

1. **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.
   a. ISBN 978-0-13-389734-0: eText + Modified Mastering Chemistry; *or*
   b. ISBN 978-0-13-409732-9: Printed Texbook + eText + Mastering Chemistry.
2. ***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
3. **Chemistry 102/105 Laboratory Manual**; Keyano College, 2020/2021 edition.
   The old editions of the lab manual are not acceptable.
4. **Student Lab Notebook with Permanent Binding**; Hayden-McNeil, Plymouth, Michigan, ISBN 978-1-930882-00-3
5. A non-programmable scientific calculator (Sharp EL-531, used for exams, is recommended).
6. Extra-long lab coat.

Course Outcomes

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

- Perform analytical and chemical kinetics experiments using laboratory equipment, and use proper laboratory safety procedures
- Explain chemical processes using physical chemistry methods, either employing the kinetics approach or the thermodynamics approach
- Analyze chemical equilibrium using Le Châtelier's principle, and perform equilibrium calculations using an ICE table for acid-base equilibria, solubility equilibria, and complex ion equilibria
- Explain electronic configurations of coordination compounds using Crystal Field Theory, and correlate it with their properties like color and paramagnetic-diamagnetic character
- Understand how the electrochemical cells operate, calculate their standard potential, and correlate the potential to the ionic concentrations in each half cell using Nernst equation

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
	B+	3.3	77 – 79.9
Good	B	3.0	74 – 76.9
	B-	2.7	70 – 73.9
	C+	2.3	67 – 69.9
Satisfactory	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

1. Chemical Kinetics	**textbook chapters**
• Reaction rates and rate laws	20.1-20.3
• Integrated rate laws	20.4-20.7
• Arrhenius model and reaction mechanism	20.8-20.10
• Catalysis	20.11

2. Equilibrium	
• Gas-phase equilibria	15.1-15.2
• ICE table and equilibrium calculations	15.3-15.5
• Le Châtelier's principle	15.6-15.7
• Acid–base equilibria	16.1-16.9
• Buffers, Indicators	17.1-17.6
• Solubility, precipitation, complex ion equilibria	18.1-18.9

3. Coordination Chemistry	
• Coordination compounds and isomers	24.1-24.4
• Localized electron model, Crystal field theory	24.5-24.9

4. Thermodynamics	
• First law: energy, heat and work	7.1-7.5
• Enthalpy, bond energies and calorimetry	7.3-7.6
• Hess' law, Sources of Energy	7.7-7.9
• Second and third laws: entropy and spontaneity	13.1-13.4
• Free energy, work and equilibrium	13.5-13.8

5. Electrochemistry	
• Voltaic cells, cell potentials	19.1-19.2
• Free energy and electrical work	19.3
• The Nernst equation	19.4
• Applications: batteries, corrosion, electrolysis	19.5-19.8

Please Note:

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

Performance Requirements and Student Services

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.

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.

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

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 throughout the semester. For a detailed list of library supports and services, go to www.keyano.ca/library. For any inquiries, please email askthelibrary@keyano.ca.

Begin your research with the Library's FIND page. Search for sources using OneSearch, the Library's Catalogue, or by searching in a specific database selected from the A-Z Database List.

Individual support with the Information Librarian is available virtually. Appointments can be requested by using the Book A Librarian online form.

Research and Subject Guides are helpful resources when beginning your research or addressing other information needs. To view a subject or course specific guide, go to the Subject Guide webpage here.

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

The Loanable Technology collection is available to support students in their online learning pursuits. Items available for borrowing include mobile projectors, webcams, noise cancelling headphones, Chromebooks, and laptops. For an up-to-date list of technology available for borrowing, go to the Library's Loanable Technology webpage.

Skill Centre: Provides academic support services to students registered in credit programs at Keyano College in the form of tutoring, assignment/lab support, writing support groups, facilitated study groups, workshops, and study space. This service is free and is available for all Math, Sciences, Humanities and Trades courses offered at Keyano.

While most courses are being offered online, the Skill Centre will be offering mostly virtual services and in-person sessions as requested. Please email Skill@keyano.ca to get in contact with our Academic Content Specialists. The Skill Centre is located in CC-119 at the Clearwater Campus.

For the most up to date information on how to book a session, please view the Keyano Skill Centre homepage.

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. The Academic Success Coach is located in the Skill Centre in CC-119 at the Clearwater Campus.

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.

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
Minimum Requirements: A Windows 10 **computer/laptop** · 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	**Minimum Requirements:** A Macintosh (V10.14 and above) **computer/laptop** · 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.
Recommended Requirements · 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.	**Recommended Requirements** · 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.
Chromebooks are **not** recommended as they are not compatible with testing lockdown browsers. A Microsoft Surface or iPad or iPad Pro may be possible alternatives in some program areas.	

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 share, distribute, or 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 share, distribute, publish or sell course related content (instructor, or students) without permission. It is important to recognize that the Canadian Copyright Act contains provisions for intellectual property. The Academic Integrity Policy provides additional information on Keyano College's expectations from students as members of the intellectual community.

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.