

**CHEM 030A, Chemistry 30***5 Credits, 6 hours lecture + 2 hours lab*

Chemistry 030 begins with a review of Chemistry 025, followed by a study of enthalpy changes and calorimetry; equilibrium Bronsted-Lowry acid-base theory and acid-base titrations; oxidation-reduction reactions and electrochemical cells, and organic chemistry, including organic reactions and nomenclature of hydrocarbons, aromatics and other functional groups.

*Alberta Education Course Equivalency: Chemistry 30.*

*Prerequisite: CHEM 025 or equivalent or permission from the Program Chair*

**Instructor**

Patricia Collins  
Office CC205 S  
780-791-8955  
[patricia.collins@keyano.ca](mailto:patricia.collins@keyano.ca)

**Office Hours**

Monday	5:00 p.m. – 5:50 p.m.
Tuesday	10:00 a.m. – 10:50 a.m.
Wednesday	3:00 p.m. – 3:50 p.m.
Thursday	10:00 a.m. – 10:50 a.m.
Friday	10:00 a.m. – 10:50 a.m.

**Hours of Instruction**

Monday	1:00 p.m. – 2:50 p.m.	Room CC235
Tuesday	1:00 p.m. – 2:50 p.m.	Room CC235
Wednesday Lab	9:00 a.m. – 10:50 a.m.	Room CC236 (dates noted on Calendar, page 4)
Friday	1:00 p.m. – 2:50 p.m.	Room CC235

**Required Resources**

- ***Chemistry 030 Student Manual***, available in print from the Keyano Bookstore.
- **Calculator**, scientific or graphing
- **Sharpie** fine point permanent marker, black
- **Lab Coat** (must be knee-length)
- **Safety goggles** (one of: Honeywell North VMAXX 112-508-10, **or** Honeywell UVEX Stealth S3970D **or** Honeywell UVEX Classic 360 S360)
- **Extra large Ziploc bag**
- **Computer** (laptop or desktop)—see page 9 for details

**Course Outcomes**

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

- use balanced chemical equations to indicate the quantitative relationships between reactants and products involved in chemical changes.
- use stoichiometry in quantitative analysis.
- communicate, calculate, and interpret energy changes in chemical reactions.
- explore classes of organic compounds as a common form of matter.
- describe chemical reactions involving organic compounds.
- explain that there is a balance of opposing reactions in chemical equilibrium systems.
- determine quantitative relationships in simple equilibrium systems.
- describe acidic and basic solutions qualitatively and quantitatively.
- explain the nature of oxidation-reduction reactions.
- apply the principles of oxidation-reduction to electrochemical cells.
- show concern for safety in planning, carrying out and reviewing laboratory activities, referring to the Workplace Hazardous Materials Information System (WHMIS) and consumer product labels.
- work collaboratively in planning and carrying out laboratory investigations and in generating and evaluating scientific ideas.

**Evaluation**

Quizzes and Assignments	30%
Lab Reports	25%
Lab Exam	5%
Midterm Exam (Units 1, 2, and 3)	20%
Final Exam (Units 4 and 5)	20%

A grade of 60% (1.7, or C-) is required for progression. The minimum standard for passing this course is a grade of 50% (1.0, or D).

**Grading System**

Descriptor	4.0 Scale	Percent
Excellent	4.0	96 – 100
	4.0	90 – 95
	3.7	85 – 89
Good	3.3	81 – 84
	3.0	77 – 80
	2.7	73 – 76
	2.3	69 – 72
Satisfactory	2.0	65 – 68
<b>Minimum Prerequisite</b>	1.7	60 – 64
Poor	1.3	55 – 59
Minimum Pass	1.0	50 – 54
Failure	0.0	0 – 49

**Proposed Schedule****Units of Study****Labs****Building Blocks of Chemistry (Review of Chemistry 025)****Exp #1**

1. Review of Inorganic Nomenclature
2. Review of Inorganic Reaction Types and Balancing Chemical Equations
3. Review of Simple Calculations and Significant Digits
4. Review of Stoichiometry

**Introduction to Organic Chemistry****Exp #2**

1. Hydrocarbons: Nomenclature and Structural Diagrams
2. Hydrocarbon Derivatives: Nomenclature and Structural Diagrams
3. Structural Isomers
4. Organic Reaction Types (including petroleum refining)

**Thermochemistry****Exp #3**

1. Thermochemical Terminology
2.  $\Delta H$  notation and Energy Diagrams
3. Thermochemical Stoichiometry
4. Measuring  $\Delta H$  using Calorimetry
5. Molar Enthalpy
6. Calculating  $\Delta H$  using Hess' Law
7. Calculating  $\Delta H$  using Enthalpies of Formation
8. Applications: Photosynthesis, Respiration, and Nuclear Energy

**MIDTERM EXAM****Acid-Base Equilibrium****Exp #4**

1. Review of Arrhenius Acid-Base Theory
2. Acid-Base Titrations: Stoichiometry and Titration Curves
3. The pH Scale and Calculations for Strong Acids and Bases
4. Introduction to Chemical Equilibrium
5. Equilibrium Disruption: Le Châtelier's Principle
6. Brønsted-Lowry Acid-Base Theory
7. Applications: Acid-Base Indicators and Buffers
8. Weak Acid-Base Calculations

**Exp #5****Electrochemistry**

1. Review of Oxidation Number Rules
2. Reduction-Oxidation Terminology
3. Methods of Balancing Redox Equations
4. Predicting Redox Reactions using a Table of Reduction Strengths
5. Galvanic (Voltaic) Cells
6. Applications: Corrosion of Metals
7. Electrolytic Cells
8. Redox Stoichiometry: Faraday's Law and Redox Titration

**Demo Lab****Lab Exam****FINAL EXAM**

**Calendar of Important Events:** shaded areas indicate no Chemistry 030 lessons.

Week	Monday	Tuesday	Wednesday	Thursday	Friday
1	Jan 3 College Closed ( <i>in lieu of New Year's Day</i> )	4 First day of classes; Compounds & Elements	5	6	7 Nomenclature
2	10 Chemical Reactions	11 Reactions (cont'd)	12 <b>Exp #1</b>	13	14 Simple Calculations
3	17 Stoichiometry	18 Stoich (cont'd): Limiting Reagents	19	20	21 Organic Intro & Alkanes <b>Exp #1 Report Due</b>
4	24 Alkenes & Alkynes	25 Isomers & Aromatics	26	27	28 HC Derivatives
5	31 HC Derivs/Reactions	Feb 1 Organic Rxns	2 <b>Exp #2: report due at end of lab</b>	3	4 Thermochemistry Intro & Terminology
6	7 Thermo Stoich	8 Calorimetry	9	10	11 Calorimetry
7	14 Hess' Law	15 Enthalpies of Formation	16 <b>Exp #3</b>	17	18 Review
8	21 Family Day Holiday College Closed	22 Reading Day— No Classes	23 Reading Day— No Classes	24 Reading Day— No Classes	25 Reading Day— No Classes
9	28 <b>MIDTERM EXAM</b> <b>Exp #3 Report Due</b>	Mar 1 Intro to Acids & Bases	2 <b>Exp #4</b>	3	4 Acid-Base Titrations
10	7 <b>Exp #4 Report Due</b> pH Review	8 Equilibrium	9	10	11 Le Chatelier's Principle
11	14 Intro to Bronsted-Lowry Theory	15 Bronsted-Lowry Reactions	16 <b>Exp #5: report due at end of lab</b>	17	18 Indicators, Buffers, and Acid Rain
12	21 pH Calcs for weak acids and bases	22 pH Calcs weak (cont'd)	23	24	25 Electrochemistry Intro
13	28 Redox Tables	29 Predicting Redox Reactions	30 <b>Demo Lab: report due at end of lab</b>	31	Apr 1 Redox Balancing Methods
14	4 Galvanic Cells	5 Galvanic & Electrolytic Cells	6	7	8 Electrolytic Cells & Faraday's Law
15	11 Redox Titration	12 Review	13 Last day; <b>Lab Exam (Exp #6)</b>	14	15 Good Friday Holiday College Closed
16	18 Easter Monday College Closed	19 FINAL EXAMS	20 FINAL EXAMS	21 FINAL EXAMS	22 FINAL EXAMS
17	25 FINAL EXAMS	26 FINAL EXAMS	27 FINAL EXAMS	28	29

**Please Note:**

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

**Final exams are scheduled by the College. Do not book travel until April 28, 2022 for courses with final exams.** Deferred exams will NOT be approved for travel, even if the travel was booked prior to enrolling in the course.

**Course Specific Policies**

1. **Attendance:** Chemistry 030 is designed as a **face-to-face course**. Extended or frequent absences for any reason can impact your overall mark. Suggestions for handling occasional absences include:
  - a. **finding a “classroom buddy”** whom you can contact for details regarding what you have missed.
  - b. **using Moodle:** log into [ilearn.keyano.ca](http://ilearn.keyano.ca) to check the Calendar and see slide notes and pre-recorded audio PowerPoint lessons.
  - c. **using OneNote:** this is the class notebook where I record daily lesson outlines and homework. Search your Keyano email during the first week of classes for an invitation from SharePoint, or use your Keyano credentials to log into [onenote.com](http://onenote.com)
  - d. **using your Keyanomail** to get in touch with me. You will receive responses during office hours.
2. **Electronic devices:** some students find usage of tablets and laptops very helpful during lectures, so you are welcomed to bring these to class. Sounds on all devices should be turned off during class and if you need to take an important call, please leave the room to avoid disrupting others. *Please do not use electronic devices to record the class in any way (audio, video, photos, etc.).*
3. **Late Work:** for full marks, assigned work must be received in hard copy and in person, in class, on the due date. If you need extra time to get an assignment completed, it will receive
  - a. the earned grade, minus 5%, if received after class on the due date.
  - b. the earned grade, minus 20%, for each additional day late.
  - c. a mark of zero if received after I have returned them, if pushed under my office door, or if left in an office door pouch.
4. **Laboratory:** our laboratories have important safety protocols and procedures which you will learn about during your WHMIS training. To complete the lab portion of the course:
  - a. **complete your WHMIS training** through Moodle prior to your first lab. Your certification is good for 2 years in Keyano’s science labs. Bring your certificate to the first lab session.
  - b. **arrive at every lab on time and in correct apparel.** It is recommended that you be ready to go 10 minutes prior to the lab. For safety reasons, students who arrive late or improperly dressed will NOT be permitted into the lab and *will receive a mark of zero* for all related lab work.
  - c. **to receive marks for a lab report, you need to arrive on time and complete the entire laboratory.** There are no make-up labs or make-up reports.
5. **Other:**
  - a. Any work showing evidence of copying or plagiarism will receive a mark of zero. (see page 6)
  - b. Chemistry 030 has in-class quizzes and Moodle quizzes (see Moodle Calendar). Moodle quizzes are completed online, in one attempt, during a limited timeframe—**see Moodle for quiz opening and closing dates**. *Extensions and “make-ups” will not be granted for any quizzes..*
  - c. A missed exam may be written at an alternate time only under certain exceptional circumstances, **at the instructor’s discretion**. The instructor must be contacted within 24 hours of the scheduled exam, and documentation (e.g. a doctor’s note) must be provided.
  - d. The final exam will be written on the date scheduled by the College; otherwise, the procedure for “Deferred Final Examination” in the Credit Calendar is to be followed.
  - e. There will be no alternative, “make-up”, or “extra credit” assignments provided for this course.

## 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](http://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. Due to the continuing situation with the Covid-19 pandemic, the offered support services will be implemented through a model to respond to the restrictions in force at the time. In-person and virtual services will be offered. 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 College is closed for statutory holidays. If you require support outside of regular business hours, please inform the support service team, and we will do our best to accommodate your needs.

**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 supports and to book an appointment, please contact [accessibility.services@keyano.ca](mailto: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](mailto: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. Students may access services virtually and in-person.

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

Individual appointments can be made by emailing [wellness.services@keyano.ca](mailto: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 online and in-person throughout the semester. For a detailed list of library supports and services, go to [www.keyano.ca/library](http://www.keyano.ca/library). For all inquiries, please email [askthelibrary@keyano.ca](mailto:askthelibrary@keyano.ca) or chat with us online.

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

Individual support with us is available. For support with citations, research and other information needs, appointments can be booked using the online [Book A Librarian Calendar](#). For support with Moodle, educational tools for assignments, Microsoft Office, Zoom, Teams and more, book an appointment using the online [Educational Technology Support Calendar](#).

Research and subject guides are helpful resources when beginning your research, assignment, using new educational technology, or addressing other information needs. To view a subject or course-specific guide, check out the complete listing of online [Subject Guides](#).

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 learning pursuits, whether online, in person or both. 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 as well as support available, go to the Library's [Loanable Technology webpage](#).

**Academic Success Centre:** The Academic Success Centre is a learning space in the Clearwater Campus (CC-119) at Keyano College. Students can gather to share ideas, collaborate on projects, get new perspectives on learning from our Academic Content Specialists, or use the Centre's educational resources. The Academic Success Centre provides academic support services to students registered in credit programs at Keyano College in the form of individual tutoring, writing support groups, facilitated study groups, workshops, and study space. Services are **free** to Keyano students.

Academic Content Specialists are available in the areas of Math, Science, Human Services, and English/Humanities. This covers all courses offered at Keyano. The Academic Success Coach can also be found in the Academic Success Centre.

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

**Academic Integrity:** The goal of the Academic Success Centre is to foster a student's ability to learn effectively and independently. Students registered at Keyano College are welcome to drop by the Centre to visit with any of our Academic Content Specialists to discuss their academic concerns.

**Availability:** Monday to Friday: 8:30 a.m. – 4:30 p.m. Flexible times may be available upon request. Virtual and in-person sessions, please email to get in contact with our Academic Content Specialists. For the most up to date information on how to book a session, please view the [Academic Success Centre homepage](#).

**Academic Success Coach:** 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](mailto:Academic.success@keyano.ca) is the best way to access resources during blended 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 can watch an online video and other course materials, take online quizzes and participate in a live class with your instructor and other students. Live/virtual classes will be hosted in Microsoft Teams or Zoom.

For all course delivery types, you will access your course resources on Keyano's learning management system, **Moodle (iLearn)**. Login in using your [Keyano username and password](#).

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 10 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><b>Minimum Requirements:</b></p> <p>A Windows 10 <b>computer/laptop</b></p> <ul style="list-style-type: none"> <li>Minimum 4GB of RAM.</li> <li>10GB+ available hard drive storage.</li> <li>Enough available hard drive space to install the Microsoft Office suite (approximately 3GB). <u>Microsoft Office</u> software is free to all Keyano students and employees.</li> <li>Microphone, webcam and speakers. A headset with a microphone is recommended.</li> <li>System updates must be regularly installed.</li> <li>Anti-Virus / Anti-Malware software</li> </ul>	<p><b>Minimum Requirements:</b></p> <p>A Macintosh (V10.14 and above) <b>computer/laptop</b></p> <ul style="list-style-type: none"> <li>Minimum 4GB of RAM.</li> <li>10GB+ available hard drive storage.</li> <li>Enough available hard drive space to install the Microsoft Office suite (approximately 3GB). <u>Microsoft Office</u> software is free to all Keyano students and employees.</li> <li>Microphone, webcam and speakers. A headset with a microphone is recommended.</li> <li>System updates must be regularly installed.</li> <li>Anti-Virus / Anti-Malware software.</li> </ul>
<p><b>Recommended Requirements</b></p> <ul style="list-style-type: none"> <li>8GB of RAM</li> <li>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.</li> </ul>	<p><b>Recommended Requirements</b></p> <ul style="list-style-type: none"> <li>8GB of RAM</li> <li>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.</li> </ul>
<p>Chromebooks are <b>not</b> 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>	

**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 course 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](mailto:its.helpdesk@keyano.ca) or calling 780-791-4965.