

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

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Office Hours

| | |
|-----------|-------------------------|
| Monday | 3:00 p.m. – 3:50 p.m. |
| Tuesday | 1:00 p.m. – 1:50 p.m. |
| Wednesday | 3:00 p.m. – 3:50 p.m. |
| Thursday | 10:00 a.m. – 10:50 a.m. |
| Friday | 12:00 p.m. – 12:50 p.m. |

Hours of Instruction

| | | |
|--------------|-----------------------|--|
| Monday | 1:00 p.m. – 2:50 p.m. | Room CC283 |
| Wednesday | 1:00 p.m. – 2:50 p.m. | Room CC283 |
| Thursday Lab | 2:00 p.m. – 3:50 p.m. | Room CC236 (dates noted on Calendar, page 4) |
| Friday | 1:00 p.m. – 2:50 p.m. | Room CC283 |

Required Resources

Chemistry 030 Student Manual, available in the Keyano Bookstore

Other supplies:

Calculator, scientific or graphing

Lab Coat—must be knee-length

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

| | |
|------------------------------|-----|
| Assignments & Quizzes | 20% |
| Laboratory Reports | 15% |
| Midterm Exam (first 3 units) | 30% |
| Lab Final Exam | 5% |
| Final Exam (last 2 units) | 30% |

The minimum pre-requisite for progression is 1.7 (refer to Grading System)

Grading System

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

Proposed Schedule of Topics**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. ΔH notation and Energy Diagrams
3. Thermochemical Stoichiometry
4. Measuring ΔH using Calorimetry
5. Molar Enthalpy
6. Calculating ΔH using Hess' Law
7. Calculating ΔH 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

Lab Exam**FINAL EXAM**

Calendar of Important Events

Dates on the following calendar are tentative; shaded areas indicate no Chemistry 030 classes.

| Week | Monday | Tuesday | Wednesday | Thursday | Friday |
|------|--|----------------------------------|----------------------------------|---------------------------------------|---|
| 1 | Jan 8 First day of Chem030 | 9 | 10 | 11 Lab Intro Session Room CC228 | 12 |
| 2 | 15 | 16 | 17 | 18 Exp #1 | 19 |
| 3 | 22 | 23 | 24 | 25 | 26 |
| 4 | 29 | 30 | 31 | Feb 1 Exp #2 | 2 |
| 5 | 5 | 6 | 7 | 8 | 9 |
| 6 | 12 | 13 | 14 | 15 Exp #3 | 16 |
| 7 | 19 Family Day Holiday College Closed | 20 Reading Day— No Classes | 21 Reading Day— No Classes | 22 Reading Day— No Classes | 23 Reading Day— No Classes |
| 8 | 26 MIDTERM EXAM | 27 | 28 | Mar 1 | 2 |
| 9 | 5 | 6 | 7 | 8 Exp #4 | 9 |
| 10 | 12 | 13 | 14 | 15 | 16 |
| 11 | 19 | 20 | 21 | 22 Exp #5 | 23 |
| 12 | 26 | 27 | 28 | 29 | 30 Good Friday Holiday College Closed |
| 13 | Apr 2 Easter Monday College Closed | 3 | 4 | 5 LAB EXAM | 6 |
| 14 | 9 | 10 | 11 | 12 | 13 Last Day of Chem 030 |
| 15 | 16 Final Exams | 17 Final Exams | 18 Final Exams | 19 Final Exams | 20 Final Exams |

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 21, 2018.

Course Specific Policies

- Attendance Policy:** Chemistry 030 is designed as a **face-to-face course**, so success is improved by being on time and regularly attending. Extended or frequent absences *for any reason cannot* be accommodated and can impact your overall mark. Some suggestions for handling occasional lecture absences include:
 - checking the Calendar of Events, News Forum and slide notes by logging into ilearn.keyano.ca
 - finding a “classroom buddy” whom you can contact for details regarding what you have missed. *I do not use ilearn to post exact slides and daily homework from the lectures.*
 - check your Keyano email frequently, as notices posted to the ilearn forum automatically go there.
- Electronic devices policy:** some students find usage of tablets and laptops very helpful during lectures, so you are welcomed to bring these to class. Sounds on all cell phones should be turned off during class and if you need to take an important call, please leave the room to avoid disrupting others. *Using electronic devices to record the class in any way (audio, video, photos, etc.) is not permitted.*
- Late Work Policy:** assigned work must be received in hard copy and in person. It will receive
 - full marks when received in class, on the due date. ☺
 - the earned grade, minus 5%, if received during office hours on the due date.
 - the earned grade, minus 20%, for each additional day late, if received during our scheduled class time or during office hours.
 - a mark of zero if received after I have returned them. I do not accept work pushed under my office door or left in an office door pouch.
- Laboratory Policy:** our laboratories have important safety protocols and procedures which you will learn about during our Laboratory Introduction Session and your WHMIS training. You will need to do the following to complete the lab portion of the course:
 - complete your WHMIS training** through ilearn prior to your first lab. You must score at least 80% on the quiz to receive your certification, which is good for 2 years in Keyano’s science labs.
 - arrive at every lab on time.** It is recommended that you be ready to go 10 minutes prior to the lab. For safety reasons, students who arrive late will NOT be permitted into the lab and *will receive a mark of zero* for all related lab work.
 - be present for every laboratory period** for your lab section. Make-up time or switching lab dates/sections is not an option, due to limited facilities, safety concerns, and staff workloads.
 - complete four labs plus the Lab Final Exam** to receive a course grade greater than 60%. Missing more than one lab for any reason means that you did not complete the lab portion of the course and did not obtain exposure to the prerequisite skills for the next level of chemistry.
- Other Course Policies and Procedures:**
 - work submitted by non-attending students may not be marked.**
 - any work showing evidence of copying or plagiarism will receive a mark of zero. (see “Student Rights and Responsibilities” in the Credit Calendar).
 - in-class quizzes cannot usually be rewritten, as these are meant to give you immediate feedback on your progress.
 - 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) provided.
 - 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.

Should you have trouble logging into ilearn.keyano.ca, please contact Keyano College Information and Technology Services (its.helpdesk@keyano.ca or 780-791-4965).

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 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 / 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 Accessibility 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.