

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

Office Hours

| | |
|----------|-------------------------|
| Monday | 3:00 p.m. – 3:50 p.m. |
| Tuesday | 10:00 a.m. – 10:50 a.m. |
| Thursday | 10:00 a.m. – 11:50 a.m. |
| Friday | 10:00 a.m. – 10:50 a.m. |

Hours of Instruction

| | | |
|--------------|-----------------------|--|
| Tuesday | 8:00 a.m. – 9:50 a.m. | Room S218 |
| Wednesday | 2:00 p.m. – 3:50 p.m. | Room S216 |
| 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 S210 |

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 |
|-----------------------------|-----------|----------|
| 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 |
| 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****Demo Lab**

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 | January 2 New Year's Day - College Closed | 3 | 4 First day of CHEM 030 | 5 Lab Introduction Room TBA | 6 |
| 2 | 9 | 10 | 11 | 12 Experiment #1 | 13 |
| 3 | 16 | 17 | 18 | 19 | 20 |
| 4 | 23 | 24 | 25 | 26 Experiment #2 | 27 |
| 5 | 30 | 31 | February 1 | 2 | 3 |
| 6 | 6 | 7 | 8 | 9 Experiment #3 | 10 |
| 7 | 13 | 14 | 15 | 16 | 17 |
| 8 | 20 Family Day - College Closed | 21 | 22 MIDTERM EXAM | 23 Experiment #4 | 24 |
| 9 | 27 Reading Week - No Class | 28 Reading Week - No Class | March 1 Reading Week - No Class | 2 Reading Week - No Class | 3 Reading Week - No Class |
| 10 | 6 | 7 | 8 | 9 | 10 |
| 11 | 13 | 14 | 15 | 16 Experiment #5 | 17 |
| 12 | 20 | 21 | 22 | 23 | 24 |
| 13 | 27 | 28 | 29 | 30 Demo Lab | 31 |
| 14 | April 3 | 4 | 5 | 6 LAB EXAM | 7 |
| 15 | 10 | 11 | 12 | 13 | 14 Good Friday - College Closed |
| 16 | 17 Easter Monday - College Closed | 18 | 19 Last day of CHEM 030 | 20 Final Exams | 21 Final Exams |
| 17 | 24 Final Exams | 25 | 26 | 27 | 28 |

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 25, 2017.

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.

Authorization

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

Patricia Collins, Instructor

Lisa Turner, Chair

Date Authorized

Vincella Thompson, Dean

Date Authorized

Signed copies to be delivered to:

Instructor

Registrar's Office