



## CHEM-115 – Chemistry for Engineering

University Arts and Science

**Effective Term & Year:** Fall 2022  
**Course Outline Review Date:** 2025-04-01

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**Program Area:** Math and Sciences

### Description:

This course provides a solid background in chemical principles required for engineering students. Topics include acid-base and redox chemistry, electronic structure of atoms and molecules, properties of liquids, gases, solids and their solutions, phase changes, thermochemistry, thermodynamics, equilibrium, kinetics and electrochemistry. This laboratory exercises emphasize proper experimental techniques, data collection and analysis, safety and technical writing skills.

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### Program Information:

This course is designed to satisfy the chemistry requirements for Engineering programs.

**Delivery Methods:** On-campus (Face-to-Face)

**Credit Type:** College of the Rockies Credits

**Credits:** 3

**Course type/s:** Lab Sciences, Sciences

### Instructional Activity and Hours:

Activity	Hours
Classroom, Directed Studies or Online Instruction	60
Seminar/Tutorials	
Laboratory/Studio	45
Practicum/Field Experience	

Co-op/Work Experience	
Other	
Total	105

**Course Requisites:**

- Complete 1 of the following
  - Completed at least 1 of the following:
    - CHEM090 – Chemistry – Provincial Level (3)
    - CH 12 – Chemistry 12
  - Completed at least 1 of the following:
    - MATH090 – Mathematics – Provincial Level
    - PREC 12 – Pre-Calculus 12

**Flexible Assessment:** Yes

In some cases students may be able to apply for recognition of prior learning outside the classroom. This flexible assessment process provides equivalent course credit. It is a rigorous process that may include external evaluation, worksite assessment, demonstration, standardized test, self-assessment, interview, products/portfolio, and challenge exam, or other measures as appropriate. Tuition fees apply. Contact an education advisor for more information.

**Course Transfer Credit:**

For information about receiving transfer credit for courses taken at either British Columbia or Alberta institutions, please see <https://www.bctransferguide.ca/> or <https://transferalberta.alberta.ca> . For more transfer credit information, please visit <https://www.cotr.bc.ca/Transfer>

All requests for course transfer credit from institutions in British Columbia or elsewhere should go to the College of the Rockies Enrolment Services office.

**Textbook Resources:**

Textbook selection varies by instructor and may change from year to year. At the Course Outline Effective Date the following textbooks were in use:

R.J. Petrucci et al., 2010, *General Chemistry: Principles and Modern Applications*, Prentice Hall.

*Course Manual for Chemistry 115* (available in COTR Bookstore)

Please see the instructor's syllabus or check COTR's online text calculator <https://textbook.cotr.bc.ca/> for a complete list of the currently required textbooks.

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## Learning Outcomes:

Upon the successful completion of this course, students will be able to:

- apply a thorough understanding of the details of modern atomic theory and the experiments which support this theory in order to correctly predict the chemical and physical properties of the elements;
  - perform calculations associated with acid-base and redox reactions;
  - draw the Lewis structures of typical inorganic species with the correct geometry using the VSEPR theory;
  - use knowledge of intermolecular forces to predict the physical properties of molecular and extended-network elements and compounds;
  - predict the physical properties of matter in the solid, liquid and gaseous states;
  - understand the basis of the unique properties of mixtures and perform related calculations;
  - apply knowledge of thermochemistry and thermodynamics to calculate enthalpy and free energy changes associated with chemical and physical processes;
  - apply the qualitative principles of equilibrium, thermodynamics and kinetics to improve understanding of chemical reactions;
  - solve quantitative problems associated with industrial processes involving equilibrium, thermodynamics and kinetics;
  - understand and apply the concepts of aqueous equilibrium to problems involving salt solubility, the behaviour of electrolytes, pH and buffers;
  - use a knowledge of electrochemistry to construct an electrochemical cell and predict the cell potential;
  - explain the significance of electrochemistry in industrial processes and corrosion;
  - perform several common laboratory procedures safely, efficiently and accurately; and
  - precisely record laboratory data, correctly perform associated calculations and present the results in a professional format.
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## Course Topics:

- Qualitative and Quantitative Aspects of Aqueous Solutions
- Redox Reactions and Electrochemistry
- Electronic Structure of Atoms
- Intermolecular Forces
- Properties of Gases, Liquids, Solids and Their Solutions
- Thermochemistry and Thermodynamics
- Kinetics

See instructor syllabus for the detailed outline of weekly readings, activities and assignments.

## Evaluation and Assessments

### Assessment Type: On-Campus (face-to-face)

Assessment Type	% of Total Grade
Assignments	5%
Term Tests	40%
Final Exam	32%
Quizzes and Assignments	3%
Laboratory Reports	13%
Laboratory Test	7%
Total	100%

### Grade Scheme

A+	A	A-	B+	B	B-	C+	C	C-	D	F
>=90	89-85	84-80	79-76	75-72	71-68	67-64	63-60	59-55	54-50	<50

**Pass requirements:** A passing average (50% or higher) in both the theory and practical components.

**Evaluation Notes:** A grade of “D” grants credit, but may not be sufficient as a prerequisite for sequential courses.

#### Evaluation Notes Comments:

Note: Attendance at all laboratory sessions and exams is required; however, arrangements can be made for documented illness or bereavement. Lecture attendance is strongly recommended and students are responsible for all course material covered in lecture and assigned readings. In order to pass the course, a passing grade (50% or greater) is required for both the laboratory portion and lecture portion of the course.

#### Exam Attendance:

Students must attend all scheduled exams at the appointed time and place. Instructors may approve an alternate exam to accommodate an illness or personal crisis. Department heads will consider other written requests. Any student who misses a scheduled exam without prior approval will receive a “0” on the exam.

#### Academic Policies:

College of the Rockies policies related to courses can be found at <https://cotr.bc.ca/about-us/college-policies/> and include the following:

- Policy 2.4.3 Students with Documented Disabilities
  - Policy 2.4.4 Student Conduct (plagiarism, other cheating, behavioral misconduct)
  - Policy 2.5.8 Academic Performance
  - Policy 2.5.3 Grade Appeal
  - Policy 2.4.9 Student Concerns Re Faculty
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### **Course Changes:**

The College of the Rockies updates course outlines regularly to meet changing educational, employment and marketing needs. The instructor will notify students in writing of any updates to this outline during the semester. The instructor reserves the right to revise, add or delete material while meeting the learning outcomes of this course outline.