

Chemistry for Engineering – CHEM 115

University Studies Program

Course Outline

COURSE IMPLEMENTATION DATE:	September 2015
OUTLINE EFFECTIVE DATE:	September 2020
COURSE OUTLINE REVIEW DATE:	April 2025

GENERAL COURSE 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.

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

Delivery: This course is delivered face-to-face.

COTR Credits: 3

Hours for this course: 105 hours

Typical Structure of Instructional Hours:

Instructional Activity	Duration
Lecture Hours	60
Seminars / Tutorials	
Laboratory / Studio Hours	45
Practicum / Field Experience Hours	
Other Contact Hours	
Total	105

Practicum Hours (if applicable):

Type of Practicum	Duration
On-the-job Experience	N/A
Formal Work Experience	N/A
Other	N/A
Total	N/A

Course Outline Author or Contact:

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Signature**APPROVAL SIGNATURES:**

Department Head

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Valid from: September 2020 – April 2025

Education Council Approval Date**COURSE PREREQUISITES AND TRANSFER CREDIT:**

Prerequisites: Either CHEM 090, Chemistry 12 or equivalent. Either MATH 090, Pre-Calculus 12, Principles of Mathematics 12, or equivalent.

Corequisites: N/A

Flexible Assessment (FA):

Credit can be awarded for this course through FA

 Yes No

Learners may request formal recognition for flexible assessment at the College of the Rockies through one or more of the following processes: External Evaluation, Worksite Assessment, Demonstration, Standardized Test, Self-assessment, Interview, Products/Portfolio, Challenge Exam. Contact an Education Advisor for more information.

Transfer Credit: For transfer information within British Columbia, Alberta and other institutions, please visit <http://www.cotr.bc.ca/Transfer>.

Students should also contact an academic advisor at the institution where they want transfer credit.

Prior Course Number: N/A

Textbooks and Required 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 <http://go.cotr.bc.ca/tuition/tCalc.asp> for a complete list of the currently required textbooks.

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 ASSESSMENT Face to Face Delivery:

Assignments	% Of Total Grade
Lecture	
Assignments	5%
Term Tests	40%
Final Exam	32%
Laboratory	
Quizzes and Assignments	3%
Laboratory Reports	13%
Laboratory Test	<u>7%</u>
Total	100%

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.

Please see the instructor syllabus for specific classroom policies related to this course, such as details of evaluation, penalties for late assignments and use of electronic aids.

EXAM POLICY:

Students must attend all required scheduled exams that make up a final grade at the appointed time and place.

Individual instructors may accommodate for illness or personal crisis. Additional accommodation will not be made unless a written request is sent to and approved by the appropriate Department Head prior to the scheduled exam.

Any student who misses a scheduled exam without approval will be given a grade of "0" for the exam.

COURSE GRADE:

Course grades are assigned as follows:

Grade	A+	A	A-	B+	B	B-	C+	C	C-	D	F
Mark (Percent)	≥ 90	89-85	84-80	79-76	75-72	71-68	67-64	63-60	59-55	54-50	< 50

A grade of "D" grants credit, but may not be sufficient as a prerequisite for sequential courses.

ACADEMIC POLICIES:

See www.cotr.bc.ca/policies for general college policies related to course activities, including grade appeals, cheating and plagiarism.

COURSE CHANGES:

Information contained in course outlines is correct at the time of publication. Content of the courses is revised on an ongoing basis to ensure relevance to changing educational, employment, and marketing needs. The instructor endeavours to provide notice of changes to students as soon as possible. The instructor reserves the right to add or delete material from courses.