



CHEM-090 – Chemistry – Provincial Level

College Preparation and Upgrading

Effective Term & Year: Fall 2022

Course Outline Review Date: 2027-03-01

Program Area: Upgrading for Academic and Career Entry

Description:

This course provides an introduction to chemistry, emphasizing gases, liquids and solids, solutions, ionization, equilibria, acids and bases, pH, rates of reaction and oxidation-reduction reactions.

Program Information:

This course or its Grade 12 equivalent is a prerequisite for many University Studies Chemistry courses. It can be used to meet the science requirement for the Certified Dental Assistant program.

Delivery Methods: On-campus (Face-to-Face), Directed/Guided Studies

Credit Type: ABE Credits

Credits: 3

Instructional Activity and Hours:

Activity	Hours
Classroom, Directed Studies or Online Instruction	45
Seminar/Tutorials	
Laboratory/Studio	45
Practicum/Field Experience	
Co-op/Work Experience	
Other	22.5 – Guided Practice

Total	112.5
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Course Requisites:

- Completed the following:
 - CHEM080 – Chemistry – Advanced Level

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:

Flowers, Neth, Robinson et al (2022) Chemistry: Atoms First 2e, Openstax,
978-1-947172-63-0

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.

Learning Outcomes:

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

- approach and solve problems using the Scientific Method;
 - understand the basic concepts of chemistry; and
 - perform laboratory experiments associated with the course content.
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Course Topics:

A. Reaction Kinetics

- Describe the collision model of chemical reactions
- Describe activation energy, endo- and exothermic reactions using potential and kinetic energy diagrams
- Describe the factors that affect reaction rate, including temperature, concentration, surface area and catalysts

B. Equilibrium

- Explain the nature of chemical equilibrium using examples
- Apply Le Chatelier's Principle
- Calculate equilibrium constants of homogenous and heterogeneous systems and equilibrium concentrations from equilibrium constants
- K_{sp} and solubility

C. Acid-Base

- Describe Bronsted-Lowry acids and bases including acid-base pairs
- Predict the relative strengths of acids
- Calculate $[H^+]$, $[OH^-]$, pH, and pOH from any one known
- Calculate pH from K_a
- Describe the characteristics of a buffer system

D. Oxidation-Reduction

- Assign oxidation states to elements in compounds
- Identify oxidizing and reducing agents
- Balance redox equations
- Describe the components of electrochemical and electrolytic cells
- Predict the voltage, E_o , of electrochemical and electrolytic cells
- Describe the applications of oxidation-reduction to everyday and industrial processes

E. Gas Laws

- Use the appropriate units and conversions for pressure, volume and temperature
- Apply Boyle's, Charles', Guy-Lussac's and the Combined Gas Laws to predict pressure, volume or temperature

- Describe an ideal gas and make calculations using the Ideal Gas Law

Chemistry laboratories are an essential component of the study of chemistry. During laboratories, student reinforce theory through practice. Laboratories develop skills in safety, procedures, techniques, data collection, analysis, and communication.

All chemistry courses must include a minimum of eight labs covering the core concepts, wherein chemistry learners will:

- List the safety and protective equipment available in a laboratory setting
- Demonstrate the appropriate procedures and techniques for dealing with particular hazards and hazardous materials
- Follow instructions and procedures
- Handle appropriate equipment for measuring mass, volume, and temperature
- Prepare solutions
- Perform titrations
- Collect and record data effectively
- Analyze and interpret data
- Communicate results and conclusions
- Write formal laboratory reports
- Participate in experimental design
- Write formal lab reports

College of the Rockies Chemistry 090 is articulated as Provincial Chemistry in the Adult Basic Education system (ABE) in British Columbia and Yukon.

ABE Provincial Chemistry is considered equivalent to Chemistry 12 by the British Columbia Ministry of Education.

The outcomes of this course meet and are consistent with the outcomes prescribed for Computer Studies: Fundamental Level in the Adult Basic Education in British Columbia Colleges – An Articulation Handbook –

<https://www.bctransferguide.ca/wp-content/uploads/2022/08/abeguide2223.pdf>

Evaluation and Assessments

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

Assessment Type	% of Total Grade
Assignments, Quizzes	15%
Lab Reports and Lab Exam	25%

Midterms	30%
Final Exam	30%
Total	100%

Grade Scheme

A+	A	A-	B+	B	B-	C+	C	C-	D	F
>=95	94-90	89-85	84-80	79-75	74-70	69-65	64-60	59-55	54-50	<50

Pass requirements: A passing mark (50% or higher) on the midterms and final exam and a 60% average on the lab component.

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

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

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.

