CHEM-090 – Chemistry – Provincial Level

College Preparation and Upgrading

Effective Term & Year: Fall 2024
Course Outline Review Date: 2029-03-01

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 is Grade 12 Chemistry equivalent and can be used to meet admission requirements or prerequisites for a variety of programs.

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

Course Requisites:

- Completed at least 1 of the following:
  - CHEM080 – Chemistry – Advanced Level
  - CH 11 – Chemistry 11

Flexible Assessment: Yes

Students are able to request formal recognition of their prior learning or experience outside the classroom. Challenge examination, portfolio-assisted assessment, or work-based assessment are used to identify, assess, and recognize prior skills, competencies, and knowledge to achieve course credit. Tuition fees apply, refer to Policy 2.5.5 Prior Learning Assessment and Recognition (PLAR) or 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 Columba 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:

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.

All Chemistry 090 – Provincial Chemistry learning outcomes follow those outlined in the current edition of Adult Basic Education: A Guide to Upgrading in British Columbia's Public Post-Secondary Institutions – An Articulation Handbook.
https://www.bctransferguide.ca/transfer-options/adult-basic-education/past-abe-guides/
(2023-2024 ABE Articulation Guide).

Chemistry learners will:

- Obtain the prerequisite body of knowledge and skills that will provide a basis for further academic and career / vocational education and training;
- demonstrate an awareness of chemistry in everyday life;
- integrate traditional knowledge focusing on local First People's Content;
- demonstrate an awareness of chemistry in solutions to environmental challenges;
- apply scientific method to investigate phenomena;
- communicate effectively using the language of chemistry;
- carry out all duties in an ethical, professional manner, including the collection and treatment of data;
- work independently and also as part of a team, where appropriate; and
- handle equipment and chemicals in a safe and effective manner with regard to personal safety and the safety of others.

A minimum of eight labs will be completed covering the core concepts.

Course Topics:

A. Reaction Kinetics

- Describe the collision model of chemical reactions
- Describe activation energy, endothermic, 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
- Calculate Ksp 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 Ka or Kb
- 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, Eo, 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.

Options

Options may include: organic functional groups, thermochemistry, nuclear chemistry, biochemistry, environmental ethics, and industrial applications.

Laboratories

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

See instructor’s 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, 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

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

Evaluation Notes Comments:

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.

Note: A minimum grade of 60% on the laboratory section of the course is required. A minimum average of 50% is required on the Midterm and the Final Examination in order to pass CHEM 090.

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 2.1.4 Course Audit
- Policy 2.4.1 Credential Framework
- Policy 2.4.3 Students with Documented Disabilities
- Policy 2.4.4 Student Rights, Responsibilities and Conduct
- Policy 2.4.8 Academic Performance
- Policy 2.4.9 Student Feedback and Concerns
- Policy 2.4.11 Storage of Academic Works
- Policy 2.5.3 Student Appeal
- Policy 2.5.5 Prior Learning Assessment and Recognition (PLAR)

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.