



CHEM-080 – Chemistry – Advanced 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 is an introduction to the science of chemistry including systems of measurement, atomic and molecular structure, the mole, the periodic table, chemical equations, the descriptive chemistry of oxygen, hydrogen and carbon and organic chemistry.

Program Information:

This course is at the ABE Advanced Level and is equivalent to Chemistry 11. It can be used for entrance to the Bachelor of Nursing program and 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: 0

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:

- Complete all of the following
 - Completed or concurrently enrolled in at least 1 of the following:
 - [MATH082](#) – Mathematics, Advanced Level (Developmental Mathematics)
 - [MATH080](#) – Mathematics – Advanced Level
 - Or any Grade 11 Math or equivalent.

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 (2019) *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:

- obtain the prerequisite body of knowledge and skills that will provide a basis for further academic and career/vocational training;
 - demonstrate an awareness of chemistry in everyday life;
 - demonstrate an awareness of chemistry in solutions to environmental challenges;
 - apply the 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.
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Course Topics:

A. Measurement

- Demonstrate the concepts of precision and accuracy and how they differ, utilizing significant figures
- Perform calculations using scientific notation
- Perform conversions with the SI system

B. Properties of Substances

- Differentiate between the phases of matter
- Identify chemical or physical properties of substances
- Describe Dalton's Atomic Theory and the Law of Constant Composition

C. Periodic Trends

- Use the periodic table to determine atomic composition of isotopes
- Use the periodic table to predict electron arrangement of chemical families in order to predict trends in ion charge, reactivity, ionization energy, electronegativity, atomic radii and ionic radii

D. Atomic Structure

- Analyze the historical development of atomic theory
- Describe the Bohr and Wave Mechanical model of the atom and cite evidence for these models including absorption and emission spectra and their use in modern technology

E. Mole Concept

- Define a mole and its significance
- Perform calculations including molar and formula mass, mole to mass conversions, and percent composition by mass of compounds

F. Bonding

- Define covalent and ionic bonding
- Construct the formulas of compounds
- Use electronegativity to predict bond types
- Draw Lewis structures, predict molecular shapes, and determine polarity

G. Nomenclature

- Write names for compounds given the formulae and write formulae for compounds given the names for the following types of compounds:
 - Covalent compounds
 - Ionic compounds
 - Compounds containing polyatomic ions
 - Compounds containing transition metals
 - Acids

H. Chemical Reactions

- Balance equations
- Classify and predict single and double replacement reactions, combustion reactions and acid-base neutralizations
- Classify synthesis, decomposition, exothermic and endothermic reactions
- Perform stoichiometric calculations including mass-to-mass, limiting reagent, and percent yield

I. Solutions

- Predict solubility and conductivity of polar and non-polar compounds
- Define Arrhenius acids and bases
- Relate the pH scale to acids and bases
- Perform calculations involving dilutions
- Perform stoichiometric calculations involving solutions including titrations

J. Organic Chemistry

- Classify substances as organic
- Differentiate the various types of bonding between carbon atoms
- Write names and draw structures of hydrocarbons
- Categorize organic compounds based on their functional groups

College of the Rockies Chemistry 080 is articulated as Advanced Chemistry in the Adult Basic

Education system (ABE) in British Columbia and Yukon.

ABE Advanced Chemistry is considered equivalent to Chemistry 11 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>

Laboratory learning is an essential component of the study of chemistry, a minimum of 8 labs will be completed to cover the core concepts in both face-to-face and directed study formats.

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

Evaluation and Assessments

Assessment Type: Directed/Guided Studies

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
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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.