COLLEGE OF THE ROCKIES

Chemistry – Provincial Level – CHEM 090

Upgrading for Academic and Career Entry

Course Outline

COURSE IMPLEMENTATION DATE:	**Pre 1998**
OUTLINE EFFECTIVE DATE:	**September 2022**
COURSE OUTLINE REVIEW DATE:	**March 2027**

GENERAL COURSE 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.

Diploma Information: This course can be used as credit towards a BC Adult Graduation Diploma.

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

ABE Credits: 3

Hours for this course: 112.5 hours

Typical Structure of Instructional Hours:

Instructional Activity	Duration
Lecture Hours	45
Seminars / Tutorials	
Laboratory / Studio Hours	45
Practicum / Field Experience Hours	
Other Contact Hours	22.5
Total	112.5

Practicum Hours (if applicable):

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

Other Contact Hours:

- Guided Practice

Course Outline Author or Contact:
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Signature

APPROVAL SIGNATURES:

Department Head
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Department Head Signature

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EDCO

Valid from: September 2022 – March 2027

Education Council Approval Date

COURSE PREREQUISITES AND TRANSFER CREDIT:

Prerequisites: Chemistry 11, or CHEM 080 or equivalent

Corequisites: None

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:

> 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 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

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

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
- 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
- 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

Options

Options may include: organic functional groups, thermochemistry, nuclear chemistry, biochemistry, 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
- 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.

For more information please refer to the BC Adult Basic Education Articulation Handbook which may be found at http://www.bctransferguide.ca/

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

EVALUATION AND ASSESSMENT:

Assignments	% Of Total Grade
Assignments, Quizzes	15%
Lab Reports and Lab Exam	25%
Midterms	30%
Final Exam	30%
Total	100%

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 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)	≥ 95	94-90	89-85	84-80	79-75	74-70	69-65	64-60	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 will endeavour to provide notice of changes to students as soon as possible. The instructor reserves the right to add or delete material from courses.