COLLEGE OF THE ROCKIES

Organic Chemistry 2 – CHEM 202

University Studies Program

Course Outline

COURSE IMPLEMENTATION DATE:	**Pre 1998**
OUTLINE EFFECTIVE DATE:	**January 2023**
COURSE OUTLINE REVIEW DATE:	**September 2028**

GENERAL COURSE DESCRIPTION:

CHEM 202 is a continuation of CHEM 201 involving the structure and reactions of the more complex aliphatic, aromatic and heterocyclic systems including an introduction to natural product chemistry and industrially important organic compounds. The laboratory stresses synthetic methods and some analytical procedures.

Program Information: CHEM 201 and CHEM 202 can also be used as components of an Associate of Arts (AA) or an Associate of Science (ASc) degree at COTR.

This course is designed for students seeking a degree or diploma in a field of science or technology. It could also be suitable as an elective course for General Interest or Arts students who have previously completed CHEM 101, CHEM 102 and CHEM 201.

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	45
Seminars / Tutorials	
Laboratory / Studio Hours	60
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	

Course Outline Author or Contact:
David G. Dick, BSc, PhD

Signature

APPROVAL SIGNATURES:

Department Head
Erin Aasland Hall
E-mail: aaslandhall@cotr.bc.ca

Department Head Signature

Dean of Business & University Studies
Darrell Bethune
E-mail: bethune@cotr.bc.ca

Dean Signature

EDCO

Valid from: January 2023 – September 2028

Education Council Approval Date

COURSE PREREQUISITES AND TRANSFER CREDIT:

Prerequisites: CHEM 201 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:

J. McMurry, *Organic Chemistry*, 9th edition, Brooks/Cole.

Course Manual for Chemistry 202

Reference material and recommended equipment:
Molecular Model Set for Organic Chemistry. Allyn and Bacon.

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 the formal rules of IUPAC (International Union of Pure and Applied Chemistry) nomenclature and stereochemical designators to name a wide variety of organic and biochemical compounds.
- By applying theory and a knowledge of structure, determine whether a species is aromatic or not and predict whether that species is likely to undergo substitution- or addition reactions.
    - Display a thorough understanding of the mechanisms of both electrophilic and nucleophilic aromatic substitution reactions and apply this knowledge to the prediction of reaction feasibility and product identities.
- Predict the products of a variety of addition, substitution and condensation reactions involving aldehydes, ketones, amines, carboxylic acids and their derivatives using a knowledge of the properties of the carbonyl group and the associated reaction mechanisms.
    - Apply previously learned principles of organic chemistry to the understanding of chemical and physical properties of complex polycyclic and heterocyclic compounds.
    - Discuss the biological roles of the nucleic acids, carbohydrates, amino acids, proteins and lipids.
- Using an understanding of organic chemistry principles and a detailed knowledge of the structures of various types of biomolecules, predict the physical and chemical properties of these molecules.
- Apply a knowledge of nuclear magnetic resonance (NMR) spectroscopy to predict the structure of molecules based on their one- and two-dimensional spectra.
    - Perform complex problem solving involving a large number of interconnected steps.
    - Work with potentially hazardous chemicals in a safe and prudent manner.
    - Recognize and efficiently use typical organic chemistry laboratory equipment without instructor assistance.
    - Operate delicate and expensive equipment in a confident and careful manner.
    - Accurately record and organize information obtained through experimentation so that you or others may utilize the information in the future.
    - Summarize the results of laboratory activities in a clear, accurate and professional manner.
    - Working independently and without instructor assistance, determine unambiguously the identity of an organic compound from a large number of possibilities by subjecting the compound to extensive physical and chemical testing.
    - Recognize the importance of natural sources for many organic chemicals and design procedures to obtain and purify certain chemicals from natural and synthetic sources.

Note: This course places heavy emphasis on the application and integration of chemical knowledge, which should assist you in developing effective problem solving skills for application in other science courses and in your future career.

This course should help students:

- Use written and oral communication skills effectively, employing methods appropriate to message and content.
- Think clearly and critically, fusing experience, knowledge and reasoning into considered judgment.
- Identify, interpret and solve problems, effectively implementing and evaluating proposed strategies.
- Set goals and priorities in academic and personal life.
- Set high performance standards.
- Demonstrate initiative, motivation, and persistence to get the job done.
- Comprehend and interpret detailed scientific and/or technical information from text.
- Search for information in professional literature.
- Critically evaluate information for accuracy, relevance and importance.
- Make generalizations (transfer knowledge and training to new situations).
- Apply a variety of mathematical techniques with the degree of accuracy required to solve problems and make decisions.
- Transfer the use of mathematical strategies from one situation to another.
- Work effectively with others in a laboratory situation.
- Receive, comprehend and interpret a sequence of instructions.
- Plan and efficiently perform a number of overlapping activities.
- Use equipment requiring careful procedures.
- Draw reasonable conclusions from observations.
- Visualize abstract concepts.
- Perform mental manipulations in 3 dimensions.
- Display confidence in a high level of subject mastery, thus enabling you to apply this mastery in new situations.

COURSE TOPICS:

- Aromaticity, benzene and substituted benzenes
- Aldehydes and ketones
- Enolates and carbanions (aldol condensation)
- Carboxylic acids
- Derivatives of carboxylic acids
- Amines
- Polycyclic and heterocyclic aromatic compounds, nucleic acids
- Carbohydrates
- Amino acids and proteins
- Lipids and related natural products
- N.M.R. spectroscopy

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

EVALUATION AND ASSESSMENT:

Assignments			% Of total Grade
Lecture	-	Assignments	5%
	-	Midterm Tests	40%
	-	Final Examination	30%
Laboratory	-	Laboratory Reports	17%
	-	Laboratory Test	5%
	-	Quizzes & Assignments	3%
		Total	100%

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

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.

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.