








Chemistry (CHEM) 360

Organic Chemistry II (Revision 8)

Status:

Replaced with new revision, see the [course listing](#)  for the current revision 

Delivery mode:

Individualized study online  with a **Supervised Lab** . This course is charged a **lab fee** .

Credits:

3

Area of study:

Science

Prerequisites:

CHEM 350. This course is open only to students with CHEM 350 or the equivalent to the first half of a university introductory organic chemistry course. Students who do not have the formal prerequisites may take the course with the permission of the coordinator, if they are judged to have the necessary background and experience. Concurrent registration in **CHEM 218**, CHEM 350, and CHEM 360 is not permitted. To avoid unnecessary delays, the course professor will normally grant permission for students to register in CHEM 360 as soon as the final examination in CHEM 350 has been written.

Precluded: None

Challenge: CHEM 360 is not available for challenge.

Faculty: [Faculty of Science and Technology](#) 

Overview

CHEM 360 is the continuation of *CHEM 350: Organic Chemistry I*. Together, the two courses provide a comprehensive introduction to organic chemistry at the second-year university level.

CHEM 360 deals with the chemistry of carbon compounds through a study of the characteristic reactions of the common functional groups. The chemistry of alcohols, ethers, aldehydes and ketones, carboxylic acids and their derivatives, carbohydrates, and amines are discussed. Particular emphasis is placed on the study of reaction mechanisms, in an attempt to show similarities between apparently unrelated reactions. The importance of stereochemistry is stressed throughout the course.

In addition to the compulsory units in the course, students will complete one of the three optional units that are devoted to the study of compounds of biological or industrial importance, including amino acids, peptides and proteins; lipids; and nucleic acids.

Further use of spectroscopy in the analysis of organic compounds is also included in the course.

The compulsory laboratory component of CHEM 360 introduces the student to the basic techniques employed in modern organic chemistry laboratories. Experiments have been selected to illustrate many of the principles encountered in the theoretical part of the course.

Outline

CHEM 360 comprises the following 12 units.

- Unit 17: Alcohols and Phenols
- Unit 18: Ethers and Epoxides; Thiols, and Sulfides
- Unit 19: Aldehydes and Ketones: Nucleophilic Addition Reactions
- Unit 20: Carboxylic Acids and Nitriles
- Unit 21: Carboxylic Acid Derivatives and Nucleophilic Acyl Substitution Reactions
- Unit 22: Carbonyl Alpha-Substitution Reactions
- Unit 23: Carbonyl Condensation Reactions
- Unit 24: Amines and Heterocycles
- Unit 25: Biomolecules: Carbohydrates
- Unit 26: Biomolecules: Amino Acids, Peptides, and Proteins (Optional)
- Unit 27: Biomolecules: Lipids (Optional)
- Unit 28: Biomolecules: Nucleic Acids (Optional)

Learning outcomes

Upon successful completion of this course, you should be able to

- apply the principles of carbonyl chemistry (including the role of carbanions and enolate ions) in a variety of syntheses.
- use critical thinking, logical deduction and data interpretation to elucidate organic structures or propose synthetic strategies.
- name and draw skeletal structures of alcohols, phenols, ethers, epoxides, thiols, sulfides, aldehydes, ketones, carboxylic acids, nitriles, carboxylic acid derivatives, amines, heterocycles and carbohydrates.
- design syntheses of organic molecules involving the compounds from Learning Outcome 3.
- draw key reaction mechanisms involving the same compounds from Learning Outcome 3 and use your knowledge of reaction mechanisms to predict the outcome of reactions.
- define the basic chemical and structural features of biomolecules, in

particular carbohydrates, and one lipid, protein, or a nucleic acid (from your choice of optional unit).

- perform advanced laboratory techniques, including the identification of functional groups, spectroscopy, handling hydrophobic reactions and carrying out multi-step syntheses.
- critically evaluate the laboratory data you have collected and communicate your laboratory findings in a clear and concise manner.

Evaluation

To **receive credit** [↗](#) for CHEM 360, you must obtain a course composite grade of at least a **D (50 percent)** [↗](#). You must achieve a minimum grade of at least 45 percent on each examination, an average of at least 60 percent on the assignments, and a grade of at least 55 per cent on the laboratory work.

The weighting of the composite grade is as follows:


Activity	Weight
Assignments	10%
Laboratory Work	20%
Midterm Exam (Units 17-22)	20%
Final Exam (Entire course)	50%
Total	100%

The **midterm and final examinations** for this course must be requested in advance and written under the supervision of an AU-approved exam invigilator. Invigilators include either ProctorU or an approved in-person invigilation centre that can accommodate online exams. Students are responsible for payment of any invigilation fees. Information on exam request deadlines, invigilators, and other exam-related questions, can be found at the **Exams and grades** [↗](#) section of the Calendar.

To learn more about assignments and examinations, please refer to

Athabasca University's [online Calendar](#) .

Materials

This course either does not have a course package or the textbooks are open-source material and available to students at no cost. This course has a [Course Administration and Technology Fee](#) , but students are not charged the Course Materials Fee.

Chemistry LibreTexts (part of STEMWiki Hyperlibrary UC). Davis, CA:

University of California, Davis, 2017.  (Online)

Chemistry 360: Organic Chemistry II Study Guide. Athabasca, AB: Athabasca

University, 2017.  (Online)

Chemistry 360: Organic Chemistry II Course Orientation. Athabasca, AB:

Athabasca University, 2017.  (Online)


Chemistry 360: Organic Chemistry II Laboratory Manual. Athabasca, AB:

Athabasca University, 2009/12.  (PDF)

Chemistry 360: Organic Chemistry II Laboratory Report Book. Athabasca,

AB: Athabasca University, 2012-2014.  (PDF)







Special Course Features

CHEM 360 has a compulsory laboratory component that requires students to complete about 32 hours of laboratory work (there are three lab formats). Credit may be obtained for equivalent laboratory work carried out within the last five years at a recognized college or university. For more information see [Chemistry Lab Exemptions](#) .

Laboratory sessions are offered throughout the year in Edmonton. It is strongly recommended that laboratory work be undertaken when about two-thirds of the course has been completed. All lab work and assignments should be completed before the final examination is attempted.

Please note that laboratory sessions offered by other universities may have a laboratory fee. For more information, please email the fst_success@athabascau.ca.

Important links

- › [Academic advising](#) 
- › [Program planning](#) 
- › [Request assistance](#) 
- › [Support services](#) 
- › [Chemistry Lab Resources](#) 
- › [Chemistry Lab Exemptions](#) 

Athabasca University reserves the right to amend course outlines occasionally and without notice. Courses offered by other delivery methods may vary from their individualized study counterparts.

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View [previous revision](#) 
