

Chemistry 221 – Introductory Organic Chemistry I

Syllabus for Fall 2018– Section 01

GENERAL INFORMATION

This 3-credit course introduces students to the basic concepts of Organic Chemistry. It is a prerequisite for : CHEM 222 (Introductory Organic Chemistry II),

Course format: Lectures and laboratories

Instructor: Dr. Guy Paquette Office: SP-201.14
Office hours: Tuesday and Thursday: 12h30 to 14h00
Email : guy.paquette@concordia.ca

Lectures: Tuesday and Thursday: 10h15 to 11h30
Location: HC-157

Lab Instructor: Zornitsa Stoyanova Office: SP-201.07
Office hours : by appointment
Email : zornitsa.stoyanova@concordia.ca

Laboratories: Sections 01L to 05L, and 56L (lab exempt)

Recommended Textbook:

Organic Chemistry 3rd Edition, by David Klein, Wiley 2017.
(paper, or ebook and solutions manual for student)

Title: Organic Chemistry 3e Ed. Looseleaf Print Companion with WileyPLUS Card and Student Solutions Manual/Study Guide ebook for Concordia University

Author: Klein

ISBN: 9781119520894 List Price: 149.95

Title: WileyPLUS for Organic Chemistry, Third Edition (available through CEI)

ISBN: 9781119338383

Author: Klein

Wiley Suggested List Price: \$100

COURSE OUTLINE:

Basic aspects of orbitals and their role in covalent bonding; delocalization of electrons. Alkanes: structure, nomenclature, isomerism, reactions. Introductory stereochemistry: enantiomers, diastereomers, conformers, Fischer and Newman projections, specification of chirality, E/Z isomerism. Conformations of cyclic compounds. Alkylhalides: SN1; SN2; E1; E2 reaction mechanisms. Free-radical reactions, organometallic compounds. Chemistry of alkenes, alkynes, and dienes.

Prerequisite: CHEM 205, 206.

This document is adapted from:

Concordia Advocacy and Support Services: *Course Syllabus Template*.

Davis, B.G. (1993). *Tools for teaching*. New York: Jossey-Bass.

Gunert, J. (1997). *The course syllabus: A learning-centered approach*. Bolton: Anker.

McGill Centre for University Teaching and Learning: *Course Outline Brief Guide*.

COURSE GRADE

The final mark is based on: 30% for the 2 midterm exams (15% each), 40% for the final, and 25% for laboratories (laboratories: 15 %, and 10% for the lab exam).

See the lab Moodle webpage for details.

A few unannounced in-class quizzes will allow for a total of up to 5 points.

If a student is absent from a midterm exam, an official written justification must be provided, (i.e. an appropriately signed doctor's note). This justification should be delivered to the instructor **no later than one week after the exam**. If there is no valid justification, the student will receive a mark of zero for the exam. If the reason for absence is valid, the value of the missed midterm exam will be added to that of the final exam.

In order to pass the course, a minimum of at least 60% (15/25) on the lab component, and of at least 50% (37.5/75) on the theory component are required.

Grade equivalence:

90 – 100	A+	85 – 89.9	A	80 – 84.9	A-
76 – 79.9	B+	73 – 75.9	B	70 – 72.9	B-
66 – 69.9	C+	63 – 65.9	C	60 – 62.9	C-
56 – 59.9	D+	53 – 59.9	D	50 – 52.9	D-
0 – 49.9	F				

IMPORTANT DATES

- Lectures for CHEM 221/2, section 01, begin Tuesday Sept. 4th
- Laboratories begin during the week of Sept. 10th
- Deadline to withdraw with tuition refund (DNE) is Monday, Sept. 17th

- Mid-term exams: TBA

- Last day to withdraw (DISC) is Monday, Nov. 5th.
- Lectures end Monday Dec. 3rd.
- Final exam period is from Dec. 5th to Dec. 19th.

(In the event of extraordinary circumstances beyond the University's control, the content and/or evaluation scheme in this course is subject to change)

LECTURE MATERIAL AND PRACTICE PROBLEMS

All concepts related to the course material will be covered in the lectures. The students are expected to read the appropriate sections of the textbook. There are no formal assignments for this course, but a list of suggested practice problems from the book will be provided with each section. It is the student's responsibility to use these problems to practice in applying the course material.

LABORATORY INFORMATION

All questions on matters related to the labs should be addressed to the Lab Instructor. **Laboratories start on the week of September 10th.**

Laboratory Coordinator : Zornitsa Stoyanova, MSc
Chem. 221 Laboratory are located at SP-116.

All students must attend the section for which they are registered during this week. All questions on matters related to the lab organization should be addressed to the lab coordinator.

Laboratory performance is graded based on the quality of the experimental work, the laboratory reports and a laboratory exam.

Do not expect a particular laboratory experiment to be directly related to the material covered in the lectures of the preceding week. **CONSIDER THE LABORATORY WORK AS AN INDEPENDENT AND ADDITIONAL LEARNING EXPERIENCE.**

LABORATORY MANUAL & MATERIALS:

The lab manual is a coursepack entitled **Introduction to Organic Chemistry 1 Laboratory Manual CHEM 221**. This is available from the University Bookstore, as are other items such as lab coats and safety glasses which are mandatory. You also need to buy a lab notebook : **CHEMISTRY STUDENT LABORATORY NOTEBOOK with carbon copies from the bookstore.**

LAB EXEMPTIONS:

Students who are repeating the course, having passed the lab component within the past two (2) years, may be eligible for a lab exemption. Applications for the exemption (forms available in SP201.01) **must apply for it before the end of the first week of the term, i.e. prior to the start of the laboratory experiments (forms available in SP-201.01 and on the departmental website), late applications will not be accepted.** Signed and completed forms are to be returned to Hilary Scuffell, (SP 275.01). Students **MUST** register for the appropriate lab exemption lab/tutorial section; students registered in any other lab/tutorial sections will be required to complete the lab portion of the course **(NO EXCEPTIONS)**.

STRATEGIC LEARNING:

Strategic Learning, collaborative study session, accompany this class. Attendance at these is voluntary but encouraged. More details about this will be given in class.

Preparation FOR LECTURES

TOPICS and PROBLEMS to try in Klein:

Chapter 1: Electrons, Bonds, and Molecular Properties. Problems: 1.1 – 1.4, 1.10, 1.12, 1.14, 1.20, 1.22 – 1.27, 1.34, 1.46, 1.47, 1.50, 1.51, 1.53, 1.66, 1.66, 1.74, 1.76.

Chapter 2: Molecular representations. Problems: 2.1, 2.3, 2.5, 2.6, 2.7, 2.8, 2.10, 2.12 – 2.20, 2.21 – 2.25, 2.35, 2.36, 2.40, 2.42, 2.43, 2.48, 2.50, 2.51, 2.52(a–e), 2.55

Chapter 3: Acids and bases. Problems: 3.1 – 3.4, 3.7, 3.10, 3.13, 3.15, 3.17, 3.22, 3.24, 3.27, 3.31, 3.32, 3.34, 3.35, 3.37, 3.38, 3.41, 3.46(a, b), 3.47, 3.48, 3.49(a,b).

Chapter 4: Alkanes and cycloalkanes. Problems: 4.1, 4.2, 4.4, 4.5, 4.6, 4.8 – 4.10, 4.14, 4.18 – 4.25, 4.27 – 4.31, 4.33 – 4.38, 4.40, 4.42 – 4.43, 4.45 – 4.46, 4.48 – 4.52, 4.55 – 4.58, 4.63, 4.65 – 4.67.

Chapter 5: Stereoisomerism. Problems: 5.3; 5.4 – 5.6; 5.9; 5.11; 5.13; 5.15; 5.19; 5.24; 5.26; 5.28; 5.36; 5.39; 5.44; 5.45; 5.47; 5.53; 5.57; 5.61 – 5.64.
E and Z Designations for alkenes. **Section 5.11**, Problem: 5.29.

Chapter 6. Mechanism and arrow pushing; hydride and CH₃ shift: **Section 6.8**,
Arrow pushing and curved arrows. **Sections 6.9, 6.10**,
Carbocation rearrangements **Sections 6.11; Section 6.12 (p. 261)**.
Problems: 6.17(a-f), 6.27(a, b); 6.28, 6.41.

Chapter 7. Nomenclature and stability of alkenes: **Section 7.7**,
Problems: 7.12, 7.13, 7.15 – 7.17.

Chapter 14. degree of unsaturation / hydrogen deficiency. **Section 14.16**,
Problems: 14.30(a, b, c, d, e, f, g, h, i), 14.31, 14.38, 14.42(a, b).

Chapter 7: Alkyl Halides. Nucleophilic Substitution (S_N1, S_N2) and Elimination (E1 and E2) Reactions. Omit kinetic isotopic effects.

Problems: 7.1 – 7.3, 7.5, 7.8, 7.9, 7.11 – 7.13, 7.15 – 7.19, 7.21, 7.23 – 7.25, 7.27, 7.29 – 7.31, 7.33, 7.37, 7.40 – 7.45, 7.47, 7.48(omit c), 7.49, 7.51, 7.57, 7.60, 7.65, 7.70, 7.72, 7.73, 7.76, 7.77(omit b).

Chapter 10. Radical Reactions.

Sections 10.1 – 10.7. Free radical chlorination and bromination of simple alkanes, mechanism, radical stability, allylic bromination.

Problems: 10.1, 10.2, 10.33(a, c, e, f)

Chapter 8. Addition reaction of Alkenes:

Hydrohalogenation: electrophilic addition of HX- mechanism, carbocation stability, acid catalyzed hydration; oxymercuration-demercuration; hydroboration-oxidation; catalytic hydrogenation; radical addition of HBr using peroxides (Klein, section 10.10); halogenation and halohydrin formation; syn dihydroxylation; oxidative cleavage; predicting the products of an addition reaction; synthesis strategies.

Omit Asymmetric catalytic hydrogenation from section 8.8 and omit Anti dihydroxylation from section 8.10.

Problems: 8.1, 8.2, 8.5 – 8.12, 8.14 – 8.22, 8.26 – 8.27 (a, b, c), 8.28 (a, b, c), 8.29, 8.31 – 8.35, 8.36, 8.37, 8.39, 8.41 – 8.47, 8.55, 8.61 – 8.64, 8.67 – 8.69, 8.71, 8.73 – 8.76.

Chapter 9: Addition reactions of Alkynes:

Nomenclature, acidity of terminal alkynes; preparation of alkynes, reduction of alkynes, hydrohalogenation of alkynes, hydration of alkynes, halogenation of alkynes, ozonolysis of alkynes or treatment with acidic KMnO_4 , alkylation of terminal alkynes, synthesis strategies.

Problems: 9.1, 9.2, 9.7, 9.9(a), 9.10, 9.11(a, b), 9.13, 9.14, 9.16(a, b), 9.18, 9.20(a, b), 9.22, 9.24(a, b, c), 9.27(a, b, c, d, e), 9.29(a – d, f), 9.32(a, b), 9.33(a, b), 9.34, 9.36, 9.37, 9.39,

Syntheses problems: Notes.

PROPER ACADEMIC CONDUCT:

MANDATORY QUIZ AND SEMINAR

As part of this course, you are **required** to i) attend a Chemistry and Biochemistry Departmental Seminar on the academic conduct code and the appropriate use of information sources and ii) pass the online quiz associated with this seminar (the passing grade for the quiz is 100%). (**Note:** This is **not** the University's quiz you may have been asked to take when you first registered and logged into the myConcordia portal; the one you must take is similar, but graded by the Department of Chemistry and Biochemistry, and you do not have access to it until after you have attended the seminar.) The aim of this seminar is to clarify the academic conduct code in terms of what practices will be considered unacceptable with regards to work submitted for grading in Chemistry and Biochemistry courses. **You are only exempt from repeating the seminar and the quiz if you have done both in Fall 2013 or more recently,*** otherwise you are required to repeat both this term. This short seminar (1 hour) will be held at the following times (note that late-comers will **not** be admitted):

Date	Time	Room
Monday, Sept. 24	16:45-17:45	HC 155
Tuesday, Sept. 25	16:45-17:45	CC 116
Tuesday, Sept. 25	20:45-21:45	HB 130
Wednesday, Sept. 26	16:45-17:45	HC 155
Wednesday, Sept. 26	20:45-21:45	SP S110
Thursday, Sept. 27	16:45-17:45	CC 115
Friday, Sept. 28	16:45-17:45	HB 130

As space for each of the seminars is limited by the room size, please **sign up** to your preferred time as soon as possible (slots fill up quickly). Sign-up sheets are available two weeks in advance of the seminars outside SP 201.01 (Departmental office). Only sign up in **available slots**: rooms must not be filled over capacity!

If you do not complete this course requirement, your final grade for the course may be lowered by one full letter grade with an incomplete (INC) notation until such time as this requirement is completed. Please refer to the undergraduate calendar (section 16.3.6) for details on removal of an incomplete notation.

* You are exempt if you can locate your ID in the pdf file located on the Departmental web site (<http://www.concordia.ca/content/dam/artsci/chemistry/docs/Compliance-list.pdf>).

PLAGIARISM AND OTHER FORMS OF ACADEMIC DISHONESTY

The Academic Code of Conduct can be found in section 17.10 of the academic calendar

(<http://www.concordia.ca/academics/undergraduate/calendar/current/17-10.html>).

Any form of unauthorized collaboration, cheating, copying or plagiarism found in this course will be reported and the appropriate sanctions applied. The mandatory seminar is a clear and fair opportunity to learn what our faculty regards as academic misconduct. Failure to take part in this learning opportunity and thus ignorance of these regulations is no excuse and will not result in a reduced sanction in any case where academic misconduct is observed.