

CONCORDIA UNIVERSITY
DEPARTMENT OF CHEMISTRY & BIOCHEMISTRY
CHEMISTRY 221/2 51 INTRODUCTORY ORGANIC CHEMISTRY I
COURSE SYLLABUS/INFORMATION – Autumn 2018

Instructor: Dr. M. McClory

Office: SP. 201 14

Lectures are in HC 157: Thursday, 6 – 8:30 p.m.

Labs are in SP-116 Tues and Wed 1:30-5:30. (NO LABS THE FIRST WEEK.)

Office hours: Thursdays, 5 – 5:45 p.m.

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TEXTBOOK

Title: Organic Chemistry 3e 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 FORMAT: Lectures and Laboratory.

INFORMATION

Operational Organic Chemistry-Lehman, 3rd or 4th Edition(for lab)

Concordia CHEM 221 Organic Chemistry I Laboratory Safety Manual.

Lab coats and safety glasses are compulsory and are available at the bookstore.

Molecular Models are very useful and are allowed to be used on the mid-term test. A tetrahedral carbon with 4 different substituents is allowed on the final exam.

Online resource for the textbook that might be useful:

<http://www.wwnorton.com/college/chemistry/organic-chem4/>

The Course Notes for Chem 221 will be posted on the Moodle site and you should download them and bring them to class.

These are the notes specifically for this evening autumn section. The Course Notes list in some detail the topics to be covered. The Course Notes as posted are incomplete and will be filled out in class i.e. it is important that you practice and learn how to draw structures and do arrow pushing in class.

- A passing grade is required in both theory and lab components of Chem 221.
- **There will be one mid-term test: Thursday, October 25th.**
- The Final Exam will be worth 70% for anyone missing the Mid-Term with a valid medical excuse.

MARKING SCHEME

Laboratory: 15%

Lab exam: 10%

Assignment: 5% (An assignment will be posted later, the date to be decided.)

Mid-Term Test: 25%, October 25th

Final Exam: 45%

Separate minimum passing marks are required for theory (weighted average of test, exam and assignments), for lab (weighted average of lab report and lab exam). Minimum passing marks for lab exam and theory is 50% (D-) and for lab is 60% (C-).

N.B. If you have not already done so, you must attend the conduct code seminar and pass the quiz on that seminar in order to avoid getting an incomplete for this course.

COURSE NUMBER & SECTIONS:

Make it a point to remember the *course number*, your *lecture section number* and your *lab section number* for the duration of the course. This information will be required frequently later when you have to fill in your answer books during examinations and when submitting lab reports, etc., to ensure that your grades are correctly recorded.

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.

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 my Concordia portal; the one you must take is similar, but graded by the Department of Chemistry and Biochemistry, and you cannot take 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 Autumn 2013 or more recently,*** otherwise you are required to repeat both this term. This short seminar (1 hour) will be held at times to be specified (note that late-comers will not be admitted).

A sign-up sheet will be available near SP 201.01 (Departmental office).

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 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.

LABORATORY INFORMATION:

Laboratory Coordinator: Lab coordinator/Lab Technician; Zornitsa Stoyanova, MSc Chem. 221 Laboratory are located at SP-116. **Laboratories start the week of (TBA):**

i.e. there are no labs in the first week.

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 note book : **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 be completed by September 15 at 5 p.m., late applications will not be accepted (*i.e.* prior to the start of the laboratory); 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 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).

Course withdrawls: Students who wish to withdraw from a course must notify the Office of the Registrar. Students who withdraw from this course must also check-out from their lab section. Students who do not properly withdraw before the specified deadlines will receive failing grades. The Academic Withdrawl date is Monday, November 5th. So I have set the date of the test as October 25th. You will thus get back your corrected test in class on Thursday, November 1st. If absent on Nov 1st, request your mark by e-mail.

LABORATORY INSTRUCTORS (TEACHING ASSISTANTS):

Each laboratory section will have one or two demonstrators who are senior undergraduates, graduate students or staff members of the department. You must know their names, emails and the location of their rooms. You will need to contact them later for matters related to your labs.

TOPICS and PROBLEMS to try in Klein:**Chapter 1. Electrons, Bonds, Molecular Properties, hybridization, polarity, etc.**

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, functional groups, curved arrows, resonance, formal charges, etc.

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, curved arrows; Arrhenius, B-L, and Lewis acids, bases etc.

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, Nomenclature, 3D Representations, Newman projection, Conformational Analysis; Mono-, cis-trans and multisubstituted cyclohexanes.

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, C-I-P system, optical Activity, enantiomers, diastereomers, meso compounds, chirality, chiral compounds, Fischer projections.

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 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. Predicting S_n and E reactions, tosylate group as a good leaving group. Omit kinetic isotopic effects.

Chapter 7 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.