

CHEM 221 - INTRODUCTORY ORGANIC CHEMISTRY I - Winter 2008

GENERAL INFORMATION

Introductory Organic Chemistry I and II (Chem 221 & 222) are a two-semester sequence required for all programmes in Chemistry, Biochemistry and Biology. Chem 221 is a prerequisite for Chem 222 and requires Chem 206 (General Chem. II) or an equivalent course such as CEGEP Chem 201. Chem 221 will introduce you to basic aspects of the structure and bonding of organic compounds, nomenclature, chemical functions and their main reactions.

Instructor Dr. Carrie W. Rogers, LOY SP-201-17
OFFICE HOURS: M-F 4-5pm (or by appointment)
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Course Format Lectures: 2.25 h per week, 13 sessions
Thurs 18:00-20:15 in LOY CC-425
Labs: 4 h per week, **starting week of Jan. 14th**
Lab room SP-116; attend section specified on your Concordia Portal

Textbooks Required: 1) P.J. Bruice, *Organic Chemistry*, 5th Edition, Prentice Hall Publishing
2) Bruice's Study Guide & Solutions Manual, Prentice Hall Publishing
3) *Lab text*: J. W. Lehman, *Operational Organic Chemistry*, Prentice Hall
4) *Lab Manual*: Concordia Dept. of Chem. & Biochem., *Organic Chemistry I*
5) any molecular model kit (e.g., Darling's Molecular Visions, or any other kit)

Molecular models

Using models helps considerably in understanding many aspects of organic chemistry, as many of the concepts require you to be able to picture, rotate and draw 3D objects. Models **are** permitted in exams. You are strongly advised to buy, borrow or share a model kit (either type sold in the bookstore is fine).

Course number, sections and course withdrawal

Make it a point to remember the *course number* (CHEM 221), your *lecture section* number (14 - 52) and your *lab section* number for the duration of the course. The information will be required for examinations and lab reports. Only students registered in the course may attend the lab and receive a grade for lab work. Students who withdraw from the course must also check out from the lab.

Lectures and readings

Lectures will reinforce and clarify the textbook with emphasis on important concepts. Come to class prepared, *i.e.*, keep up with the material and read the relevant sections of the textbook. Take detailed notes during class, then work through them after the lecture along with the textbook and molecular models. The best approach to success at organic chemistry is to practice applying your knowledge by doing PROBLEMS.

GRADING SCHEME

To pass the course, you must obtain at least 50% on the coursework (problem sets, midterms and final exam) and at least 60% on the laboratory work. The final grade will be weighted as follows:

Problem Sets: 10% (distributed in class; each due two weeks after handed out)
Midterm Exam: 15% (during class time on **Feb.28**)
Laboratory Marks: 25% (lab reports 15%; lab exam 10% during class time on **Mar.27**)
Final Exam: 50% (in April; scheduled by Exams Office)

Problem Sets must be handed in at the beginning of class on the due date. Late submissions will not be accepted. Papers slid under an office door will not be graded. Solutions to the problems will be posted after the due date.

If absent from an examination, you must produce a written excuse on letterhead paper appropriately signed (e.g., by a doctor or employer) **ASAP and no later than one week after the exam**. The Department determines the validity of the absence and necessary arrangements will be made. If **no valid excuse** is produced, the student will receive a **zero** grade for the missed test.

LABORATORY INFORMATION

The laboratory co-ordinator is **Ms. Rita Umbrasas**, SP-330.01, Tel. 848-2424 Ext. 3354. **All questions on matters related to the lab component of the course should be addressed to her.** All students **must attend the section for which they are registered.** Changes will be considered only in exceptional circumstances (e.g., course conflict). If you miss a lab, you must provide a medical note, or you will receive a grade of zero. Only one absence is allowed. Laboratory performance is graded on the quality of the experimental work and the report, as well as the Lab Exam.

The CHEM 221 laboratories are located in SP-116. Starting the week of Monday, Jan. 14th, you will have a lab EVERY week; please refer to the attached schedule of experiments. Each laboratory section will have one or two demonstrators (TAs); be sure to write down your TAs' contact information in case you need to reach them.

Materials required for labs: (1) J. W. Lehman, *Operational Organic Chemistry*, Prentice Hall Publishing; (at University Bookstore) (2) *Organic Chemistry I, Laboratory Manual*, Dept. of Chemistry & Biochemistry; PLUS a lab coat and safety glasses (mandatory).

*Students who are repeating the course may request to be exempted from the labs by contacting Ms. R. Umbrasas during the **first week** of lectures. If denied exemption, the laboratory component of the course must be repeated.*

STRATEGIC LEARNING (see also http://learning.concordia.ca/SL_basics.shtml)

Research shows that students who attend Strategic Learning groups earn higher grades and withdraw less often than students who do not participate. Strategic Learning (SL) leaders are undergraduate students who have recently taken the selected course and done well in it. Their role is to facilitate collaborative learning among students who attend the groups. They are trained so that they can help students develop effective learning and study strategies appropriate to course material. Their role is NOT to lecture and teach course content but rather to help students interact with course material using effective learning strategies. The SL sessions integrate how to learn with what to learn. Students have the opportunity to become actively involved in the course material as the SL leaders use the text and lecture notes as vehicles for improving students' study skills and learning strategies and thus their understanding of course content. Sessions of one hour each are scheduled outside class time, usually at different times each week. Attendance is voluntary; groups are open to all students in the class throughout the semester. Early in the term, the SL leader assigned to our course will introduce himself / herself to the class and announce the times and locations of the SL sessions. **Please take advantage of this programme!**

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 (note: passing grade for the quiz is 100%). 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. Should you have already attended these sessions you are not required to repeat them this semester. This short seminar (1 hour) will be held at the times shown in the table below:

As space for each of the seminars is limited by the room size, please sign up to your preferred time. Sign up sheets are available inside 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.

Date	Time	Place
Thursday, Jan. 10	16:45 - 17:45	CC-321
Friday, Jan. 11	16:45 - 17:45	CC-321
Monday, Jan. 14	16:45 - 17:45	CC-321
Tuesday, Jan. 15	16:45 - 17:45	CC-321
Tuesday, Jan. 15	20:30 - 21:30	CC-321
Wednesday, Jan. 16	20:30 - 21:30	HC-112

CHEM 221 - INTRODUCTORY ORGANIC CHEMISTRY I

Lecture Section /4 – 52 Dr. Carrie ROGERS Thurs 18:00-20:15 in CC-425

LECTURE SCHEDULE & READINGS LIST

You may not be responsible for everything in each chapter; consult the lecture notes & website for details.

Readings from: P.J. Bruice, *Organic Chemistry*, 5th Edition, Prentice Hall Publishing.

Class	Date	Chapter topic	A glimpse of the lecture content...	Sections
1	Jan.03	Review: Principles of structure & bonding	Bonding theory, atomic & molecular orbitals, representations of structure, formal charges, polarity	1.1–1.15
2	Jan.10	Organic acids & bases	Brønsted & Lewis acids/bases, acid-base equilibria, effect of structure on acidity/basicity, resonance effects	1.16–1.26, 6.10 7.1–7.5, 7.9
3	Jan.17	Alkanes & cycloalkanes	Nomenclature of common organic compounds, isomerism & physical properties, substituted alkanes, line structures, conformations, Newman projections	2.1–2.10
4	Jan.24	Alkenes	Cycloalkanes Alkene nomenclature, isomerism, curved-arrow mechanisms, thermodynamics vs. kinetics	2.11–2.14 3.1–3.8
5	Jan.31		Reactions of Alkenes - Electrophilic addition rxns, mechanisms, carbocation stabilities, rearrangements, stability of terminal & internal alkenes	4.1–4.11
6	Feb.07	Stereochemistry	Introduction to organic synthesis Stereoisomers, enantiomers, chirality & stereocentres, optical activity, diastereomers, cyclic compounds	4.12 5.1–5.14
7	Feb.14	Alkynes	Racemic mixtures & resolution, formation of stereoisomers in reactions e.g. electrophilic addns Nomenclature, alkynes as acids, electrophilic rxns	5.15–5.21 briefly: 6.1–6.12
Feb.21		Reading week – no classes or labs		
8	Feb.28	Alkane reactivity	Midterm Examination (Ch.1 – Ch.4) Chemical properties of alkanes, radical halogenation, radical stability	11.1–11.9
9	Mar.06	Nucleophilic substitution rxns	Finish radical halogenation... S _N 1 & S _N 2 substitution reactions: mechanisms	8.1–8.5
10	Mar.13		S _N 1 & S _N 2 substitution rxns: factors affecting type & rate of substitution (structure, transition state stability, solvent, leaving group, nucleophilicity), stereochemistry of products	8.6–8.12
11	Mar.20	Elimination rxns	E1 & E2 elimination reactions: mechanisms, regioselectivity, stereochemistry	9.1–9.11, 10.4
12	Mar.27		Lab Examination (all Operations from labs) E1 & E2 elimination rxns continued...	
13	Apr.03	Organic synthesis	Designing reaction pathways to build target molecules	4.12, 6.12, 9.11
FINAL EXAM (3 h, worth 50%) –time TBA				Cumulative

CHEM 221 - INTRODUCTORY ORGANIC CHEMISTRY I**LABORATORY SCHEDULE – W2008**

Mon. Jan. 14 - Fri. Jan. 18	Check - In / Safety Instruction & Demonstration of Laboratory Techniques I & II	
Mon. Jan. 21 - Fri. Jan. 25	Exp. 1	Learning Basic Operations: The Effect of pH on a Food Preservative & Measuring the Density of an Unknown Liquid
Mon. Jan. 28 - Fri. Feb. 1	Exp. 2	Extraction & Evaporation: Separating the Components of "Panacetin"
Mon. Feb. 4 - Fri. Feb. 8	Exp. 3	Recrystallization and Melting Point Measurement: Identifying a Component of "Panacetin"
Mon. Feb. 11 - Fri. Feb. 15	Exp. 5	Simple Distillation: Preparation of Synthetic Banana Oil
Mon. Feb. 18 – Fri. Feb. 22	MIDTERM BREAK	
Mon. Feb. 25 - Fri. Feb. 29	Exp. 6	Fractional Distillation: Separation of Petroleum Hydrocarbons
Mon. March 3 – Fri. March 7	Exp. 8	Boiling Point, Refractive Index: Identification of a Petroleum Hydrocarbon
Mon. March 10 - Fri. March 14	Exp. 15 & Check - Out	Thin Layer Chromatographic Analysis of Drug Components