

**Introductory Organic Chemistry II (3 credits)****Instructor: Dr. Christopher J. Wilds**

Office: LSP 201.13 (848-2424 x 5798)

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Office Hours: Tuesday and Thursday from 1:00 - 2:00 PM (or by appointment)

**Course Description:** Introduction to the use of IR and NMR spectroscopy for the identification of simple organic compounds. Benzene and aromatic compounds: Aromaticity, electrophilic aromatic substitution, nucleophilic aromatic substitution, substituent effects. Chemistry of aldehydes and ketones: Nucleophilic addition, oxidation, reduction, and condensation reactions, tautomerism. Chemistry of carboxylic acids and their derivatives. Chemistry of alcohols, ethers, and related compounds. Amines: Basicity, reactions. Lectures and laboratory. Prerequisites: CHEM 206 and 221.

**Textbooks:**

**Highly recommended:** Organic Chemistry, 3<sup>rd</sup> Edition by David Klein  
Study Guide and Solutions Manual - Organic Chemistry, 3<sup>rd</sup> Edition  
by David Klein  
Introductory Organic Chemistry II Lab Manual

**Grading:**

		<b>Method A</b>	<b>Method B</b>
Pop Quizzes/Participation	(five quizzes, in class, TBA)	10 %	10 %
Midterm Exam	October 22 <sup>nd</sup> (in class, 1 ¼ hr)	25 %	15 %
Lab Exam	November 21 <sup>st</sup> (in class, 30 min)	10 %	10 %
Labs	consult the calendar	15 %	15 %
Final exam	TBA	40 %	50 %

**The most advantageous method will be used to calculate your grade!**

**If you miss the midterm due to a medical emergency or a death in the immediate family** you must (1) email me immediately and (2) provide me with a medical certificate or death certificate within 4 days of the missed exam. If the document is valid, then the grade on the final exam will count for both (65 %). No other reason for missing an exam will be accepted.

Students should note that the material in chapters 8 and 9 (alkenes and alkynes) in Klein (3<sup>rd</sup> Edition) were covered in Chemistry 221 and should be reviewed. A familiarity with this material and the concepts of S<sub>N</sub>1, S<sub>N</sub>2, E1 and E2 reactions (chapter 7) are required background for this course.

***Use of electronic devices such as cell phones during lectures is prohibited.***

### Laboratory Information:

The laboratory coordinator is Vincent Lau (office: SP 201.10; tel.: 848-2424 x 5976; email: Vincent.Lau@concordia.ca). All questions related to the labs should be addressed to him. Experiments will begin the week of Monday, September 9<sup>th</sup>. The lab manual is available as a coursepack entitled, "Introductory Organic Chemistry II Lab Manual", which is available at the university bookstore. You are also required to purchase a laboratory notebook. Lab coats and safety glasses are compulsory and must be worn in the laboratory at all times.

Students who are repeating the course, and have passed the lab component within the past two (2) years, may request a lab exemption. Applications for the exemption are available in SP 201.01. Signed and completed forms are to be returned to Hilary Scuffell (SP 275.01) by Friday, September 6<sup>th</sup> at noon. Late applications will not be accepted. 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**). When a student receives a lab exemption for a lab taken at Concordia, the previous lab mark will be used again in determining the new grade.

You must pass the laboratory portion to pass the course! Your lab grade will be based on lab reports (15 %) and a lab exam (10 %). **You must obtain 15 / 25 (and pass the laboratory exam) or you will fail the course with an "R" grade.**

### Strategic Learning (SL):

In order to help you perform to the best of your ability the department of Student Learning Services has organized Strategic Learning (SL) Groups (see [http://learning.concordia.ca/SL\\_basics.shtml](http://learning.concordia.ca/SL_basics.shtml)) 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. To this end, 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 the course content but rather to help students interact with course material using effective learning strategies. Sessions of one hour each are scheduled outside class time, usually at 2 different times each week. Attendance is voluntary; groups are open to all students in the class throughout the semester.

### 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 2014 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. 16	16:45-17:45	CC 111
Tuesday, Sept. 17	16:45-17:45	CC 308
Tuesday, Sept. 17	20:45-21:45	HB 130
Wednesday, Sept. 18	16:45-17:45	CC 308
Wednesday, Sept. 18	20:45-21:45	HB 130
Thursday, Sept. 19	16:45-17:45	HC 155
Friday, Sept. 20	16:45-17:45	HC 157

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 16.3.5) 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.

**CHEM 222 SCHEDULE - FALL 2019**  
(may be subject to change)

Term dates: Sept. 3 - Dec. 19

LAST DATE TO WITH TUITION REFUND = Sept. 16  
LAST DATE TO DROP CLASS (DISC) = Nov. 4

Date	Topic	Chapters in Klein (3 <sup>rd</sup> ed)	Suggested Problems in Klein (3 <sup>rd</sup> ed)
Sept. 3	Introduction and Mass Spectrometry	14.8-14.11, 14.12 (Fragmentation of Alkanes), 14.16	14.18, 14.19, 14.22, 14.23, 14.24 a,b, 14.27, 14.30, 14.31, 14.38, 14.40, 14.47, 14.48
Sept. 5			
Sept. 10	Infrared Spectroscopy and UV & VIS Spectroscopy	14.1-14.7, 16.11 (The Information in a UV-Vis Spectrum), 16.12	14.9, 14.10, 14.12, 14.14, 14.15, 14.17, 14.34, 14.35, 14.36, 14.37, 14.45, 14.46, 14.49, 14.54, 14.56, 14.57, 14.58
Sept. 12			
Sept. 17	Nuclear Magnetic Resonance Spectroscopy	15.1-15.3, 15.4 (Chemical Equivalence), 15.5-15.12, 17.8, 19.13, 20.15, 22.13	15.3, 15.5, 15.8, 15.10, 15.11, 15.12, 15.13, 15.15, 15.16, 15.21, 15.26, 15.32, 15.33, 15.35, 15.36, 15.37, 15.38, 15.42, 15.47, 15.48, 15.55, 15.56, 15.57, 15.58, 15.59, 15.63, 15.64, 15.65, 15.77, 17.22 a, 17.23 a, 17.54, 19.79, 20.77, 22.31, 22.80, 22.81
Sept. 19			
Sept. 24			
Sept. 26			
Oct. 1	Reactions of Dienes / Delocalized Electrons	16.1-16.7	16.4, 16.6, 16.7, 16.9, 16.13, 16.15, 16.16, 16.17, 16.18, 16.31, 16.33, 16.35, 16.36, 16.39, 16.40, 16.42, 16.43
Oct. 3			
Oct. 8	Reactions of Alcohols, Ethers, Epoxides and Sulfur Containing Compounds	12.1-12.3, 12.9-12.10, 13.1-13.8, 13.10-13.12, 23.1-23.3	12.4, 12.5, 12.7, 12.8, 12.17, 12.18, 12.19, 12.20 a,b,c,e, 12.30, 12.31, 12.32 a,b,c,e,f,g,h,i,j,k, 12.33, 12.38, 12.39, 12.43 a,b, 12.44 a,b,c,d, 12.54 c,e, 12.55, 13.5, 13.7, 13.8, 13.9, 13.10, 13.13, 13.16 a,b,c,e, 13.17, 13.18, 13.20, 13.21 a,b, 13.22 a,b,c,d, 13.24 a,c,e,g,h,i, 13.27, 13.29, 13.37, 13.38, 13.39, 13.41, 13.42, 13.44, 13.45, 13.51, 23.2, 23.5
Oct. 10			
Oct. 15	Aromaticity - Reactions of Benzene	17.1-17.6, 17.7 (Hydrogenation), 18.1-18.6	17.17, 17.18, 17.42, 17.43, 17.46, 17.50, 17.51, 17.53, 17.54, 17.69, 18.2, 18.4, 18.5, 18.8, 18.9, 18.38
Oct. 17			
Oct. 22	<b>MIDTERM EXAM (1 ¼ hr, 10:15 - 11:30 AM)</b>		
Oct. 24	Reactions of Substituted Benzenes	18.7-18.12, 22.11	18.11, 18.12, 18.13, 18.14, 18.15, 18.16, 18.18, 18.20, 18.22, 18.24, 18.25, 18.26, 18.28, 18.39, 18.40, 18.41, 18.42, 18.43, 18.44, 18.45, 18.46, 18.47, 18.49, 18.52, 18.53, 18.54, 18.55, 18.61, 18.63, 18.64, 18.65, 18.66, 18.67, 18.79, 18.83, 18.88, 18.89, 18.90, 22.26 a,b,c,d
Oct. 29			
Oct. 31	Carboxylic Acids, Derivatives of Carboxylic Acids: Acyl Compounds	20.1-20.14	20.4, 20.5, 20.6, 20.9, 20.10, 20.11, 20.14, 20.16, 20.17, 20.18, 20.19, 20.20, 20.21, 20.22, 20.24, 20.25, 20.27, 20.29, 20.30, 20.32, 20.35, 20.45, 20.46, 20.47, 20.48, 20.50, 20.51, 20.53, 20.61, 20.87, 20.88, 20.89
Nov. 5			
Nov. 7	Carbonyl Chemistry: Addition Reactions	8.12, 12.4, 12.6, 19.1-19.7, 19.9-19.10, 19.12	19.5, 19.6, 19.8, 19.10, 19.12, 19.13, 19.14, 19.15, 19.17, 19.18, 19.19, 19.20, 19.23, 19.28, 19.30, 19.31, 19.32, 19.33, 19.34, 19.49, 19.52, 19.55, 19.57 a,b,c, 19.59, 19.60, 19.61, 19.63, 19.75, 19.76, 19.77, 19.82, 19.91, 19.92, 19.93
Nov. 12			
Nov. 14	Carbonyl Chemistry: Reactions at the $\alpha$ Position	21.1, 21.2 (Alpha Halogenation in Acidic Conditions, Alpha Halogenation in Basic Conditions: The Haloform Reaction), 21.3 (Aldol Reactions), 21.5 (Alkylation via Enolate Ions)	21.1, 21.2, 21.3, 21.4, 21.8, 21.9, 21.12, 21.13, 21.14, 21.29, 21.30, 21.47, 21.50, 21.51, 21.52, 21.53, 21.78 a,g
Nov. 19			
Nov. 21	<b>LAB EXAM (30 min, 10:15 - 10:45 AM)</b>		
Nov. 26	Amines	22.1-22.4, 22.5 (Alkylation of Ammonia), 22.6, 22.8, 22.10 (Primary Amines and Nitrous Acid)	22.7, 22.10, 22.22, 22.44, 22.50, 22.54 b
Nov. 28	Review		

**DEPARTMENT OF CHEMISTRY AND BIOCHEMISTRY**  
**CHEMISTRY 222**  
**LABORATORY SCHEDULE**  
**FALL 2019**

<b>Date:</b>	<b>Experiment No.</b>	<b>Title:</b>
Mon. Sept. 9 - Fri. Sept. 13	Check In / Safety Instructions & Exp. 4	Synthesis of Salicylic Acid from Wintergreen Oil
Mon. Sept. 16 - Fri. Sept. 20	Exp. 11 (Wk # 1)	Identification of Unknown Ketones
Mon. Sept. 23 - Fri. Sept. 27	Exp. 11 (Wk # 2)	Identification of Unknown Ketones (NMR demonstration + practice problem sets)
Mon. Sept. 30 - Fri. Oct. 4	Exp. 7	A Green Synthesis of Camphor
Mon. Oct. 7 - Fri. Oct. 11	Exp. 42	Haloform Oxidation of 4'-Methoxyacetophenone (IR demonstration)
Tues. Oct. 15 - Mon. Oct. 21	Exp. 20	Reaction of Iodoethane with Sodium Saccharin, an Ambident Nucleophile (NMR)
Tues. Oct. 22 - Mon. Oct. 28	Exp. 30	Synthesis of Triphenylmethanol and the Trityl Carbocation
Tues. Oct. 29 - Mon. Nov. 4	Exp. 30	Synthesis of Triphenylmethanol and the Trityl Carbocation
Tues. Nov. 5 - Mon. Nov. 11	Exp. 29	Borohydride Reduction of Vanillin to Vanillyl Alcohol
Tues. Nov. 12 - Mon. Nov. 18	Exp. 9 & Check Out	Isolation and Isomerization of Lycopene from Tomato Paste (UV)