

Loyola University Chicago

Syllabus Organic Chemistry II CHEM 224 008; Monday, January 13 - Friday, April 24; 2020

Lecture: M, W, F 10:25 AM - 11:15 AM; LIFE SCIENCE BUILDING (LSB) 142; Prerequisite CHEM 223

Instructor: Donald May Contact: dmay4@luc.edu Office: Flanner Hall 403: W 11:30 AM – 12:30 PM

Discussion: All Sections in Flanner Hall 105; 009: M 11:30 AM – 12:20 PM; 010 M 01:40 PM – 02:30 PM

Required Materials: Textbook: ORGANIC CHEMISTRY by David Klein; 3rd edition

Optional: - Student Study Guide and Solutions Manual, ISBN 978-1-119-37869-3

- Molecular Model kit

As a possible study aid, you may want to consider purchasing, a paperback by D.R. Klein entitled “Organic Chemistry as a Second Language: Translating the Basic Concepts” (I&II); 2004 by John Wiley & Sons, Inc.; ISBN 0-471-27235-3; www.wiley.com/college/klein. These are designed to help the student develop the skills required to solve a variety of problems in organic chemistry and to point out the fundamental principles in organic chemistry. An additional study aid is a paperback by D.P. Weeks entitled “Pushing Electrons: A Guide for Students of Organic Chemistry,” Third Edition (Thomson Brooks/Cole); ISBN 0-03-020693-6. The first 3 chapters (pp. 1-161) of this workbook are intended to help a student understand “structure and bonding in organic molecules,” as well as techniques of “electron pushing” so as to comprehend reaction mechanisms.

Supplementary Textbooks: Organic Chemistry, Eighth Edition by Wade (Pearson; 2016)

Organic Chemistry, Tenth Edition, by T.W.G. Solomons and C. Fryhle (John Wiley & Sons, Inc., 2011).

Organic Chemistry, Eighth Edition, by J. McMurry (Brooks/Cole Publishing Co., 2012).

Organic Chemistry, by F.A.Carey and R.M. Giuliano, Eighth Edition (McGraw-Hill, Inc., 2011).

Organic Chemistry: Structure and Function, by K.P.C. Vollhardt and N.E. Schore, Sixth Edition (W.H. Freeman and Co., 2011).

Method of instruction: Lecture and discussion. Lectures may be supplemented with classroom discussion, use of molecular models, use of multimedia, and/or use of computer based materials as well as individual and/or group problem solving. Suggested problems will be given from the textbook but will not be graded. Students are allowed to work together on discussion handouts. Students are expected to attend the discussion on time; students must have the discussion handout initialized by the instructor to possibly obtain credit; students must turn in their own discussion handout by the announced due date: only the original will be accepted; no late handouts will be accepted; no photocopies accepted; students must follow the directions on the handouts. Discussion handouts will contribute 10% toward the final grade: the lowest discussion handout score will be dropped: any single missed discussion handout will be the dropped score with any additional missed discussion handouts incorporated with a zero score. Students must attend the lecture/discussion to receive the handout and to turn in the original initialized handout, by the due date; early handouts are accepted. Students are expected to attend the discussion on time; students must have the discussion handout initialized by the instructor to possibly obtain credit; students must turn in their own discussion handout by the announced due date: only the original will be accepted; no late handouts will be accepted; no photocopies accepted; students must follow the directions on the handouts. Discussion handouts will contribute 10% toward the final grade: the lowest discussion handout score will be dropped: any single missed discussion handout will be the dropped score with any additional missed discussion handouts incorporated with a zero score. Students must attend the lecture/discussion to receive the handout and only the original initialized handout, by the due date will be accepted; early handouts are accepted. Original initialized handouts will only be accepted: Attached e-mail or electronic copies of discussion handouts will not be accepted. Discussion handouts must be completed: in regular #2 or HB pencil only, are expected to be neat and legible, free of scribbling/scribbled responses, incorporate correct chemical symbols (Review the Chemical Periodic Table of the Elements). The instructor reserves the right to modify any and all of the course requirements at any time.

Final course grade assigned: A: 100% – 88.0% A-: 87.9% – 84.0% B+: 83.9% – 80.0%

B: 79.9% – 76.0% B-: 75.9% – 72.0% C+: 71.9% – 68.0% C: 67.9% – 64.0% C-: 63.9% – 60.0%

D+: 59.9% – 56.0% D: 55.9% – 52.0% F: < 52.0%

Grading: Semester grades will be determined by the following criteria: discussion handouts at 10%, Three unit exams with the comprehensive final; Students are responsible for obtaining all graded materials, which will be returned during the next scheduled discussion. Final grades will be determined from one of the following unit exam/ final exam contribution options, whichever is higher: **EXAM DATES: (Tentative) EXAM I: Monday, February 10, 2020; EXAM II: Monday, March 16, 2020; EXAM III: Wednesday, April 08, 2020; FINAL EXAM 09:00 AM – 11:00 AM Monday, April 27, 2020**

EXAM CONTRIBUTION OPTION 1: All three (3) unit exams at 20% each = 60% + final exam 30% = 90%

EXAM CONTRIBUTION OPTION 2: Best two (2) unit exams at 20% each = 40% + final exam 50% = 90%

OPTION #1: Discussion Handouts: 10%

3 Unit Exams@60% + Final Exam@30%

Total: 100%

OPTION #2: Discussion Handouts: 10%

2 Unit Exams@40% + Final Exam @50%

Total: 100%

No early and no make-up in-class exams; No late discussion handouts. For a single, missed in-class unit exam, Option #2 automatically, will be utilized to determine the final course grade. Any subsequent missed in-class exams will be scored as zero. See attached schedule. Exams will incorporate all theory up to and including all lectures and discussions, prior to the exam. There are no early and no make-up unit exams. Students must bring and present their Loyola I.D. to each exam. Students are not allowed to leave during exams. If you leave, you must turn in your exam and you will be considered finished with the exam. If a student begins an exam it must be turned in for grading. Students must turn in all exam materials/pages when finished. Exam copies cannot be taken from lecture: see Academic Integrity Violations. Graded exams will be returned as soon as possible. Issues with graded exams must be submitted within 5 days of being returned, otherwise scores will be considered final. Students must submit a signed statement requesting a review of the exam question, although the entire exam is now subject to being re-graded. Any single regrade will be considered the final score and no subsequent regrade request will be considered. The student

must have a valid and verifiable reason for missing the final exam, such as a serious illness requiring hospitalization, and so forth. Oversleeping, not knowing the date and time of the final exam or not being prepared and so forth, are not valid reasons. If a verifiable and valid reason cannot be provided, a zero score for the final exam will be recorded. Any make-up final exam will be in a different format.

Student Conduct: Only students officially enrolled for the course may attend. Students must attend only the discussion section for which they are officially enrolled. Students who are absent from lecture(s) should get the lecture notes from another student. At all times students are expected to conduct themselves in a mature and professional manner, which includes but is not limited to: treating everyone in class with respect, avoidance of extraneous comments and small group discussions during lecture. Eating, chewing gum/tobacco products and drinking (food items) are not allowed. Students are expected to take care of their personal matters before discussions/ lectures/exams. Additionally radios, headphones, cell-phones or similar devices are not permitted during discussions/ lectures/exams. Not all contingencies can be listed but inappropriate conduct will be addressed. Disruptive students will be asked to leave. If a cell phone rings (beeps, buzz, etc.) during any exam, the exam will be collected and the student will not be allowed to continue. Exam questions, however, will come predominantly from lecture notes and from concepts related to suggested homework problems. If a student begins an exam it must be turned in for grading. Students are not allowed to leave the room during exams until their exam is handed in for grading. If you leave, you must turn in your exam and you will be considered finished. Please keep noises and sounds to a minimum. When leaving, be respectful and leave quietly. During exams, only religious caps/ hats/hoods are allowed: nonreligious caps, hats, hoods, visors and so forth, will not be allowed to be worn during exams. All personal materials, besides pencils and erasers, will be placed at the front of the room, if available. Students will sit in every other seat during exams, if possible. Other specific instructions will also be given for exams.

Academic Integrity: Consult the Undergraduate Studies Handbook for additional information. All students in this course are expected to have read and to abide by the demanding standard of personal honesty, drafted by the College of Arts & Sciences, which can be viewed at: http://www.luc.edu/cas/pdfs/CAS_Academic_Integrity_Statement_December_07.pdf

Anything you submit that is incorporated as part of your grade in this course must represent your own work, unless indicated otherwise. All exams are closed book and closed note: No external materials or personnel are allowed. During exams, violations include but are not limited to: cell phone ringing, answering/using a cell phone, using unauthorized notes or books, looking at another student's exam, talking to other students, opening and/or utilizing anything in your book bag, and so forth. Any student found to be in violation or cheating will, at minimum, be given a zero for the assignment/exam and the incident will be reported to the Chemistry Department Chair and the Office of the CAS Dean. Option #1 will automatically apply and a zero for that exam will be recorded. Depending on the seriousness of the incident, additional sanctions may be imposed. Materials from the course cannot be shared outside the course without the instructor's written permission. Students may not be aware of copyright and intellectual property rights. Materials from the course cannot be shared outside the course without the instructor's written permission. Students may not be aware of copyright and intellectual property rights.

Course Practices Required: College-level writing skills on exams; communication skills for discussion and articulation of questions; completion of reading assignments and hand-outs. It is recommended that the student read through each chapter before lecture and eventually work through the suggested problems before the exam. Tutoring is available in the Sullivan Center; The ACS Loyola Chapter also provides tutoring, free of charge, on a walk-in basis, during the week in Flanner 129 (days/time announced); A few graduate students serve as private, one-to-one tutors but have individual rates of remuneration/monetary compensation for their services.

Learning Objectives: Students who successfully complete this course will be able to do the following at an acceptable level: Name and draw complex organic structures; Predict both physical and chemical properties as well as identify and name, aromatics, phenols, aldehydes, ketones, carboxylic acids, derivatives of carboxylic acid, and amines; Describe and differentiate between various mechanisms, such as electrophilic versus nucleophilic aromatic substitution; Relate reaction mechanisms to intermediates, stereochemistry, and kinetics; predict reaction mechanism from experimentally related data and vice versa; Work with multi-step reaction pathways; develop synthetic pathways to simple organic compounds Use NMR, IR, UV, and mass spectrometry data to identify structures; predict the spectroscopic data from the structure; Identify and describe biomolecules including carbohydrates, amino acids/proteins and heterocyclic/nucleotide/nucleic acids; Predict the structure and stereochemistry of various carbonyl and other condensation reactions.

Disability Accommodations: Students requiring accommodations at the University need to contact the Coordinator of Services for Student Accessibility Center (SAC), Sullivan Center. Accommodations are provided after receiving documentation from SAC Testing and allowance of a reasonable time frame for arrangements (minimally, one week in advance). Accommodations cannot be retroactive. Contact: <http://www.luc.edu/sac/>

Monday, January 20: No classes: Holiday

Monday, February 10: Summer 2020 Registration

Monday - Friday, March 02 - 06: Spring Break: No classes

Monday, March 23: Last day for "W" otherwise "WF"

Monday, March 30: Fall 2020 Registration begins

Thursday-Friday, April 09-13: No classes after 04:15 PM on Thursday: Easter Holiday

Monday April 13: Classes starting on or after 04:00 PM are held

Academic Calendar, www.luc.edu/academics/schedules Students wanting to drop lecture after midterm may stay in the co-req lab only if lecture midterm grade, posted in LOUCS, is a D or better. Students should continue to attend the lecture until the week of the drop date to gain as much background knowledge as possible. For Spring 2020 students wishing to drop lecture, and have a mid-term grade of D or better (in lecture), can seek assistance from the Department of Chemistry & Biochemistry office beginning Tuesday March 17 at 9:00am through Monday March 23th at 4:00pm. Students with a midterm grade of F must drop the co-req lab along with the lecture. No exceptions. **Course Repeat Rule** Effective with the Fall 2017 semester, students are allowed only three (3) attempts to pass courses in the Chemistry and Biochemistry department with a C- or better grade. The

three attempts include withdrawals (W). After the second attempt the student must secure approval for a third attempt. Students must come to the Chemistry Department, fill out a permission to register form or print it from the Department of Chemistry & Biochemistry website: <http://www.luc.edu/chemistry/forms> and obtain a signature from the Undergraduate Program Director, Assistant Chairperson, or Chairperson in Chemistry. A copy of this form is then taken to your Academic Advisor in Sullivan to secure final permission for the attempt.

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Lecture Outline (tentative / subject to change)

Week	Date	Chapter	Topic
1	01/13	14	Infrared Spectroscopy and Mass Spectrometry Review
	01/15	15	¹ H and ¹³ C NMR Spectroscopy
	01/17	15	¹ H and ¹³ C NMR Spectroscopy
2	01/20		NO CLASS: Holiday
	01/22	15	¹ H and ¹³ C NMR Spectroscopy
	01/24	16	Molecular Orbital Theory
3	01/27	16	Molecular Orbital Theory
	01/29	16	Molecular Orbital Theory
	01/31	16	Conjugated Systems, Orbital Symmetry; 1,2 vs. 1,4 additions to 1,3-dienes
4	02/03	16	Conjugated Systems, Orbital Symmetry; 1,2 vs. 1,4 additions to 1,3-dienes
	02/05	16	Diels-Alder Reactions
	02/07	16	Diels-Alder Reactions
5	02/10		EXAM I
	02/12	17	Aromatic Compounds and Ions, Huckel's rule
	02/14	17	Aromatic Compounds and Ions
6	02/17	17	Aromatic Compounds and Ions
	02/19	18	Reactions of Aromatic compounds
	02/21	18	Reactions of Aromatic Compounds
7	02/24	18	Reactions of Aromatic Compounds
	02/26	18	Reactions of Aromatic Compounds
	02/28	19	Aldehydes and Ketones, Nomenclature, Physical properties
8	03/02		NO CLASS: SPRING BREAK
	03/04		NO CLASS: SPRING BREAK
	03/06		NO CLASS: SPRING BREAK
9	03/09	19	Aldehydes and Ketones, Reactions, Synthesis
	03/11	19	Aldehydes and Ketones; Reactions, Synthesis
	03/13	19	Aldehydes and Ketones; Reactions, Synthesis
10	03/16		EXAM II
	03/18	20	Carboxylic Acids, Nomenclature, Physical Properties, Acidities
	03/20	20	Carboxylic Acids: Reactions; Syntheses
11	03/23	20	Carboxylic Acids: Reactions; Syntheses " W " day
	03/25	20	Reactions; Synthesis
	03/27	20	Reactions; Synthesis
12	03/30	22	Amines: Nomenclature, Physical Properties, Acidities of Salts
	04/01	22	Amines: Reactions, Synthesis
	04/03	22	Amines: Reactions, Synthesis
13	04/06	21	Condensations of carbonyls; alpha substitution
	04/08	21	EXAM III
	04/10		NO CLASS: Holiday
14	04/13		NO CLASS: Holiday
	04/15	24	Condensations of carbonyls; alpha substitution
	04/17	24	Carbohydrates and Nucleic Acids
15	04/20	24	Carbohydrates and Nucleic Acids
	04/22	25	Amino Acids
	04/24	25	Amino Acids
16	04/27		Monday, April 27: FINAL EXAM 09:00 AM – 11:00 AM