

Loyola University Chicago
Chemistry 224 – Spring 2024 – Syllabus

The purpose of this syllabus is to describe the course, resources, and policies. It is meant to help all students understand the expectations and requirements for the course, and it should be used as a reference for questions about policies. When updates to the syllabus are made during the term, a new version will be posted electronically, and all students will be notified.

Course Information: Course: Chemistry 224 – Organic Chemistry B (3 credits: Lecture & Discussion)

Prerequisites: Completion of Chemistry 223 or equivalent with a grade of C- or better. A student missing a prerequisite may be withdrawn at any time.

Time Zone: This syllabus lists dates/times using Chicago local time (U.S. Central Time Zone)

In-Person Learning: All graded assignments scheduled during class time are available in class only.

Lectures: Section 012, M,W 04:15 pm - 05:30 pm, Flanner Hall 133;

Discussions: You must attend only the section for which you registered:

- Section 013 Mondays, 10:25 am – 11:15 am, Flanner Hall 105
- Section 014 Mondays, 01:40 pm – 02:30 pm, Flanner Hall 105
- Section 015 Mondays, 02:45 pm – 03:35 pm, Flanner Hall 105

Course Coordinator: Dr. Kelvin Billingsley (Ph.D.); kbillingsley@luc.edu

Chemistry 224 is a multi-section lecture & discussion course with common content and common outcomes across all sections. This course includes a Common Final Exam during the Common Final Exam Period as scheduled by the University. This Exam will be cumulative for both semesters of Organic Chemistry. The Course Coordinator is responsible for consultation and coordination with instructors regarding policies, exam writing, and grading. Your Section Instructor is responsible for communicating with you regarding all course content and policies and is the first and primary person you should contact with questions about all aspects of the course. As needed, all Section Instructors will consult with the Course Coordinator throughout the semester.

Section Instructor: Donald May; Contact Information: (dmay4@luc.edu); Office: Flanner Hall 403

Email: if you are emailing me about this course, you may either: (1) reply directly to one of my messages, which are sent via Sakai and therefore automatically labeled with our course number or (2) type "CHEM 224" in the subject line of your email. Doing either of these will ensure that I read your message.

Office Hours Schedule: WEDNESDAYS. 11:00 AM – 12:00 PM; Appointments are not required.

SI information

There are Supplemental Instruction (SI) study sessions available for this course. SI sessions are led by an SI leader, LUKE MATHEWS, who is a student that has recently completed my CHEM 224 course. Session attendance is open to all, and is voluntary. Times and locations for the SI session can be found here: www.luc.edu/tutoring. Students who attend these interactive sessions find themselves working with peers as they compare notes, demonstrate and discuss pertinent problems and concepts, and share study and test-taking strategies. Research shows students who regularly attend sessions, develop a better understanding of course concepts than those who do not. Students are asked to arrive with their Loyola ID number, lecture notes, and textbook.

Required Course Materials

- Textbook: eText via [WileyPlus](#) and/or hard copy: Organic Chemistry, Klein, David, 4th edition.
- Loyola Sakai course management site: sakai.luc.edu/portal/ and tools integrated into the site.
- Loyola email: messages are sent to the entire class via Sakai, linked to your Loyola email account
- Calculators are not used in this course.

Recommended Course Materials: Student Solutions Manual Molecular Model Kit; check with bookstore as they apparently have several choices available;

Other examples:

Duluth Labs: <https://duluthlabs.com/pages/product-comparison>

Pearson Prentice-Hall: ISBN-13: 978-0205081363

Darling Molecular Visions: ISBN-13: 978-0964883710

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).

Copyright/Intellectual Property reminder: Course materials provided by your instructors at Loyola, **including my materials, may not be shared outside any course without the instructor's written permission**. Content posted without permission will be in violation of Copyright/Intellectual Property laws.

Course Content & Learning Outcomes

Prerequisite knowledge from Chemistry 223 is necessary for in-depth study of topics in Chemistry 224. Topics will include: nomenclature, structures, properties, reactions, mechanisms, spectroscopy, and syntheses of arenes, carbonyls, carboxyl groups, amines, carbohydrates, lipids, and amino acids. If successful, the student will be able to:

1. identify the various classes of organic compounds, their methods of preparation, and typical reactions.
2. name and draw specific organic compounds.
3. visualize and interpret multiple representations of organic molecules depicting connectivity, configuration, and conformations.
4. postulate logical reaction mechanisms for organic reactions.
5. discriminate among relative stabilities of reactive intermediates.
6. plan and write out single and multi-step syntheses using known reagents and conditions.
7. identify and compare general physical properties of organic compounds.
8. analyze, interpret, and predict spectral data (MS, IR, NMR) used in identifying organic compounds.
9. describe and analyze how organic chemistry affects physiological processes.

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 expected to attend the discussion on time; Graded discussion handouts may be assigned and be submitted as a group or may be assigned on an individual student basis; no make-up handouts will be accepted; no photocopies accepted; students must follow the directions on the handouts. **Discussion handouts will contribute 20% total, 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 are expected to attend the discussion on time; 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). Students are expected to: Attend lectures and discussions on time; staying for the entire duration of lecture; College-level writing skills on exams; Communication skills for discussion and articulation of questions; Timely completion of suggested homework and reading assignments. It is recommended that the student read through each chapter before lecture and eventually work through the suggested problems.

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.

Student Accommodations: Loyola University provides reasonable accommodations for students with disabilities. Any student requesting accommodations related to a disability or other condition is required to register with Student Accessibility Center (SAC), located in Sullivan Center, Suite 117. Professors receive the accommodation notification from SAC via Accommodate. Students are encouraged to meet with their professor individually to discuss their accommodations. All information will remain confidential. Please note that in this class, software may be used to record class lectures to provide equal access to students with disabilities. Students approved for this accommodation use recordings for their personal study only and recordings may not be shared with other people or used in any way against the faculty member, other lecturers, or students whose classroom comments are recorded as part of the class activity. Recordings are deleted at the end of the semester. For more information about registering with SAC or questions about accommodations, please contact SAC at 773-508-3700 or SAC@luc.edu.

The instructor reserves the right to modify all the course requirements at any time, including exam dates, course %-grade correlation, order of chapters/topics covered.

Student Conduct: RETURNING TO CAMPUS: Please be familiar with and adhere to all guidelines posted on the *On-Campus Guidelines in Classroom Scenarios of the Return to Campus Guidelines* site:

<https://www.luc.edu/returntocampus/classroomscenarios/>

Course Repeat Rule: Effective with the Fall 2017 semester, students are allowed only THREE attempts to pass Chemistry courses with a C- or better grade. The three attempts include withdrawals (W). The Department advises that it is preferable to complete a course with a grade of C or C-, and to demonstrate growth in future coursework, than to withdraw from a course. 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: <https://www.luc.edu/chemistry/forms/> and personally meet and obtain a signature from either 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.

Academic Integrity: 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: <https://www.luc.edu/cas/advising/academicintegritystatement/>

A basic mission of a university is to search for and to communicate the truth as it is honestly perceived. A genuine learning community cannot exist unless this demanding standard is a fundamental tenet of the intellectual life of the community. Students of Loyola University Chicago are expected to know, to respect, and to practice this standard of personal honesty. Academic dishonesty can take several forms, including, but not limited to cheating, plagiarism, copying another student's work, and submitting false documents.

Any instance of dishonesty (including those detailed on the website provided above or in this syllabus) will be reported to The Chair of The Department of Chemistry & Biochemistry who will decide what the next steps may be. Evidence of cheating in this course will result in, at a minimum, a score of zero (which cannot be dropped from grade calculations) and penalty up to failure of the course. College policies include that instructors will report incidents of academic misconduct to their chairperson as well as to the Assistant Dean for Student Academic Affairs in the CAS Dean's Office. I will report the incident to the Chemistry & Biochemistry Department for further action(s).

Academic Dishonesty also includes, but is not limited to, such infractions as:

- Obtaining a copy of tests or scoring devices
- Using another student's answers during an examination
- Providing another student questions or answers to or copies of examination questions
- Having another person impersonate the student to assist the student academically
- Impersonating another student to assist the student academically
- Representing as one's own work the product of someone else's creativity
- Using, or having available for use, notes or other unpermitted materials during "closed book" examinations
- Duplicating any portion of another student's homework, paper, project, laboratory report, take-home examination, electronic file or application for submission as accepting a copy of tests or scoring devices
- Having someone other than the student prepare any portion of the student's homework, paper, project, laboratory report, take-home examination, electronic file or application, other than for a teacher-approved collaborative effort.
- Permitting another student to copy any portion of another student's homework, paper, project, laboratory report, take-home examination, electronic file or application other than for a teacher-approved collaborative effort
- Using any portion of copyrighted or published material, including but not limited to electronic or print media, without crediting the source
- Any other action intended to obtain credit for work that is not one's own.

Loyola University Absence Policy for Students in Co-Curricular Activities (including ROTC):

Students missing classes while representing Loyola University Chicago in an official capacity (e.g., intercollegiate athletics, debate team, model government organization) shall be allowed by the faculty member of record to make up any assignments and to receive notes or other written information distributed in the missed classes. Students should discuss with faculty the potential consequences of missing lectures and the ways in which they can be remedied. Students must provide their instructors with proper documentation i.e., "[Athletic Competition & Travel Letter](#)" describing the reason for and date of the absence.

This documentation must be signed by an appropriate faculty or staff member and it must be provided to the professor in the first week of a semester. It is the responsibility of the student to make up any assignments. If the student misses an examination, the instructor is required to allow the student to take the examination at another time. (<https://www.luc.edu/athletheadvising/attendance.shtml>)

Students who will miss class for an academic competition or conference must provide proper documentation to their instructor as early in the semester as possible.

Accommodations for Religious Reasons: If you have observances of religious holidays that will cause you to miss class or otherwise effect your performance in the class you must alert the instructor within 10 calendar days of the first class meeting of the semester to request special accommodations, which will be handled on a case by case basis.

Universal Absence Accommodation Policy

The purpose of a universal absence accommodation policy is to account for emergency circumstances (e.g., serious illness, caring for a family member, car accident) that require you to be absent from class, while maintaining fairness in grading for students who attend and complete all in-class graded assignments. We believe that class attendance and participation are essential for your success in this class, and that your health is important to us and our shared community. Please use good judgement and stay home if necessary/prudent for your circumstances. This is the universal accommodation policy for in-class graded assignments:

One missed in-class exam due to absence for any reason is already accommodated in the course grading system. Given that only the best two in-class exams are included in this calculation, a missed exam would be the one not included in this calculation, as it would be the lowest score (0%) of the three exams.

You may provide documentation for an absence, but it is not required. These accommodations are automatically available to all students

Pass/Fail Conversion Deadlines and Audit Policy

A student may request to convert a course into or out of the “Pass/No-Pass” or “Audit” status only within the first two weeks of the semester. For the Spring 2024 semester, students are able to convert a class to “Pass/No-Pass” or “Audit” through, January 29th. Students must submit a request for Pass/No-Pass or Audit to their Academic Advisor.

Health, Safety, and Well-Being On-Campus

Please be familiar with and adhere to all policies and protocols posted on the *Campus Info & Resources* site:

<https://www.luc.edu/healthsafetyandwellbeing/campusinforesources/>

Classroom Masking Policy: We will follow all University guidance and requirements for masking, including any updates made during the semester. It will remain a principle of this class-section that, out of respect for the health of housemates and others in regular contact with members of our community, we will be respectful of anyone who wears a mask in the classroom.

Class Recording & Content Information

In general lectures, may be recorded. The following is a mandatory statement for all courses in the College of Arts & Sciences (CAS). We will discuss class norms and standards during the first week and continue the discussion as needed throughout the semester.

Privacy Statement: Assuring privacy among faculty and students engaged in online and face-to-face instructional activities helps promote open and robust conversations and mitigates concerns that comments made within the context of the class will be shared beyond the classroom. As such, recordings of instructional activities occurring in online or face-to-face classes may be used solely for internal class purposes by the faculty member and students registered for the course, and only during the period in which the course is offered. Students will be informed of such recordings by a statement in the syllabus for the course in which they will be recorded. Instructors who wish to make subsequent use of recordings that include student activity may do so only with informed written consent of the students involved or if all student activity is removed from the recording. Recordings including student activity that have been initiated by the instructor may be retained by the instructor only for individual use.

Additional Content, Copyright & Intellectual Property Statement

By default, students may not share any course content outside the class without the informed written consent of the owner of that content. This includes any additional recordings posted by students, materials provided by the instructor, and publisher-provided materials. For example, lectures, quiz/exam questions, book figures/slides, and videos may not be shared online outside the class. In some cases, copyright/IP violations may overlap with breaches of academic integrity. Remember that obtaining consent to share materials is an active process.

Changes to Syllabus

There may be changes to the syllabus during the semester. *You are responsible for all syllabus changes made in class whether or not you attend.*

Other Items

- A link to the official Loyola calendar can be found here: <https://www.luc.edu/academics/schedules/>
- The Withdraw deadline for the semester is on Monday March 25th.
- Loyola is using SmartEvals to provide instructor & course feedback. [OIE](#) will send emails near the end of the term.
- A tentative class schedule is listed below. We will cover most of Chapters 15-26 this semester, and pre-lecture readings will be continually updated and expected. Please be prepared to help your classmates get

caught up if they miss a class for any reason. Establish a communication plan to share notes/topics/outlines as needed.

Final Exam

The University sets the schedule for all final exams, held on: TBA; Location will be updated on LOCUS when available. You will have exactly 2 hours to complete the exam. Additional time will not be granted, even if you start late. There will be no make-up final exams given under any circumstance, and the exam will not be given early, either. Instructors may not reschedule final exams for a class for another day and/or time during the final exam period. There can be no divergence from the posted schedule of dates for final exams. Individual students who have four (4) final examinations scheduled for the same date may request to have one of those exams rescheduled. If a student reports having four final examinations scheduled for the same date, students should be directed to e-mail a petition to Adam Patricoski, Assistant Dean for Student Academic Affairs, CAS Dean's Office (apatricoski@luc.edu).

The purpose of exams is to align your course grade with your level of learning, based on your ability to complete a cumulative and comprehensive test on the application of essential course concepts. The final is a 2-hour exam, completed on paper, in class on the last day of the term. Questions may include all material assigned for the semester. The final exam will not be returned, and a score will be posted on Sakai. Note that completing the final exam is mandatory to earn a passing course grade (C- or higher).

Course Grading System

The departmental standards for each letter grade are listed here according to all required course components. Each student will receive a midterm grade via LOCUS at least one week prior to the Withdraw deadline for the semester. Grades are only based on the criteria listed in the syllabus: no substitutions and no additions.

Grading Scheme: Graded Discussion: 20% (lowest graded discussion score is dropped); Best two (2 out of 3) unit exams @ 25% each = 50%; final exam 30%; Total 100% *the final exam is mandatory to earn a passing grade

Letter Grade Cutoffs*:	
A 90.0%	C+ 65.0%
A- 85.0%	C 60.0%
B+ 80.0%	C- 55.0%
B 75.0%	D 40.0%
B- 70.0%	F < 40%

Exams are self-contained and are ~100 points completed by each individual student at 50 minutes; graded discussions are 20 pts., completed as a group at 30 minutes.

No early and no make-up in-class exams; No make-up final exams will be given. No make-up discussion handouts. For a single, missed in-class unit exam, for any reason, this exam will serve as the dropped score contribution. Any subsequent missed in-class exams will be scored as zero. See attached schedule.

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. Students must turn in all exam pages when finished. Exams cannot be taken from lecture: see Academic Integrity Violations. Students must bring and present their Loyola I.D. for each exam.

Posting of Grades: Final course grades at the end of the semester are posted only LOCUS. Grades are never sent via email

Course Topics

Chapter 15: NMR Chapter 16: Conjugated Systems & Pericyclic Reactions
Chapter 17: Aromatic Compounds Chapter 18: Aromatic Substitution Reactions
Chapter 19: Aldehydes and Ketones Chapter 20: Carboxylic Acids & Derivatives
Chapter 21: α -Carbon Chemistry Chapter 22: Amines
Chapter 24: Carbohydrates Chapter 25: Amino Acids: Chapter 26: Lipids

**EXAM DATES: Tentative: EXAM I, Monday, February 12, 2024: EXAM II, Monday, March 18, 2024:
EXAM III, Monday, April 15, 2024: FINAL EXAM: WEDNESDAY, 07:00 PM – 09:00 PM, MAY 01, 2024**

Lecture Outline (tentative / subject to change)

Week	Date	Chapter	Topic
1	M 01/15 W 01/17	15	NO CLASS: Holiday ^1H and ^{13}C NMR Spectroscopy, REVIEW
2	M 01/22 W 01/24	15	^1H and ^{13}C NMR Spectroscopy ^1H and ^{13}C NMR Spectroscopy
3	M 01/29 W 01/31	16 16	Conjugated Systems Molecular Orbital Theory; 1,2 vs. 1,4 additions to 1,3-dienes
4	M 02/05 W 02/07	16 17	Diels-Alder Reactions M.O. Theory Revisited GRADED DISCUSSION Aromatic Compounds/Ions, Huckel's rule SN1/E1 , SN2/E2 RXNS Benzylic Carbon
5	M 02/12 W 02/14	17	EXAM I; SUMMER REGISTRATION Aromatic Nomenclature
6	M 02/19 W 02/21	18 18	Reactions of Aromatic Compounds Reactions of Aromatic Compounds
7	M 02/26 W 02/28	18 19	Reactions of Aromatic Compounds Aldehydes and Ketones; Nomenclature, Reactions, Synthesis
8	M 03/04 W 03/06 F 03/08		NO CLASS: SPRING BREAK NO CLASS: SPRING BREAK NO CLASS: SPRING BREAK
9	M 03/11 W 03/13	19 19	Aldehydes and Ketones; Reactions, Synthesis GRADED DISCUSSION Aldehydes and Ketones; Spectroscopy
10	M 03/18 W 03/20	20	EXAM II Carboxylic Acids, Nomenclature, Physical Properties, Acidities
11	M 03/25 W 03/27	20 20	Carboxylic Acids: Reactions; "W" day Reactions; Synthesis, Syntheses Spectroscopy
12	M 04/01 W 04/03	22 22	Amines: Nomenclature, Physical Properties, Acidities, Salts Amines: Reactions, Synthesis, Spectroscopy
13	M 04/08 W 04/10	21 21	Condensations of carbonyls; alpha substitution GRADED DISCUSSION Condensations of carbonyls; alpha substitution
14	M 04/15 W 04/17	24	EXAM III; FALL 2024 REGISTRATION Carbohydrates and Nucleic Acids
15	M 04/22 W 04/24	24 25 26	Carbohydrates and Nucleic Acids Amino Acids, Lipids
16	04/29-05/05		FINAL EXAM: WEDNESDAY, 07:00 PM – 09:00 PM, MAY 01, 2024 LOCATION TBA