# Syllabus – Organic Chemistry II

## Course Information

**Course:** Chemistry 222 – Organic Chemistry II
**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 A student missing a prerequisite may be withdrawn at any time.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:** MWF 2:45-3:35, CH 002
**Discussions:** You must attend the section for which you are registered:

- Sec 002: Tuesday, 1-1:50 pm, MUND 504
- Sec 003: Tuesday, 2:30-3:20 pm, MUND 415

**Laboratory:** You must attend the section for which you are registered:

- Sec 005: Tuesday, 5:45-8:30 pm, LSB 115
- Sec 006: Wednesday, 8:30-11:15 am, LSB 115

## Instructor Contact Information

**Lecture Instructor:** Dr. Amy Balija
**Laboratory Instructor:** Mr. Tim Thomas
**Office:** FH 104
**Email:** abalija@luc.edu
**Office Hours Policy:** Office hours are a time set aside by the instructor for students to ask questions in a smaller setting. Students are encouraged to come to office hours. No appointment is necessary during the times listed under Office Hours Schedule.
**Office Hours Schedule:** M 1-2 pm, FH 129
W 10-12:00 pm, STEM Resource Center, St. Joseph's Hall Cafeteria
F 11:30-12:30 pm, STEM Resource Center, St. Joseph's Hall Cafeteria
Or by appointment

## Course Materials

**Required**

- Textbook: eText via WileyPlus and/or hard copy: Organic Chemistry, Klein, David, 4th edition
- Loyola Sakai course management site: sakai.luc.edu/portal/
- Loyola email: messages are sent to the entire class via Sakai
- Additional web-based systems may be used for uploading your work and facilitating feedback and evaluation. Registration will be free but required. These may include Gradescope.
- Additional software may be used. Downloads will be free but required. These may include applications that convert photos to pdfs (examples: CamScanner, Scannable, GeniusScan), and collaboration materials for group work (example: OneNote).
- Molecular Model Kit

**Recommended**

- Solutions Manual

**Copyright/Intellectual Property Reminder**

**Course Content & Learning Outcomes**

Prerequisite knowledge from Chemistry 221 is necessary for in-depth study of topics in Chemistry 222. Topics include: nomenclature, structures, properties, reactions, mechanisms, spectroscopy, and syntheses of arenes, carbonyls, carboxyls, amines, carbohydrates, lipids, and amino acids. If successful, the student will:

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 the way we live and die
10. Perform organic transformations and analyze products using spectroscopic techniques

**Class Attendance & Course Coverage**

Material comprehension and attendance is obtained via Plicker. Keep your Plicker card safe and bring it to every class.

If you miss a class for any reason, it is your responsibility to work through the content. Contact a classmate for further discussion of the topics as you are still responsible for all material covered and assigned.

An outline will be shown at the beginning of each class and uncompleted lecture notes/handouts/ links/animations will be posted on Sakai. We will not cover every topic in every chapter of the textbook this semester. Focus first on the material that is directly covered in lecture or Voice Over Videos. Explore the additional material in the textbook for your own interest and enrichment.

**Classroom & Group Work Guidelines**

The classroom is a space designed for learning. My expectations are that all voices will be heard and appreciated in the classroom, and that we will invite each other to engage while recognizing that contributions can take multiple forms.

**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 in order to discuss their accommodations. All information will remain confidential. Please note that in this class, software may be used to record class lectures in order 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.

**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, submitting false documents, and deliberately disrupting the performance of other class members.*

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 incidents to the Chemistry & Biochemistry Department for further action(s)**.**

**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/athleteadvising/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.

**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 27.
• Loyola uses SmartEvals to provide instructor & course feedback. Emails describing this will come at the term.

**Class Recording & Content Information**
In general lecture, meetings 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.

**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 2023 semester, students are able to convert a class to "Pass/No-Pass" or "Audit" through Monday, January 30th. 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 guidelines posted on the *Heath, Safety, and Well-Being Update* site: (https://www.luc.edu/healthsafetyandwellbeing/.) This site relays important updates and protocols related to COVID-19 and other matters.

**Final Exam**
The University sets the schedule for all final exams. The final will be held on: Friday **May 5th at 4:15 pm**. 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).

**Lecture Exams**
Three exams will be administered in class on **2/20**, **3/24**, and **4/24**. Exam questions will emphasize material covered in lectures and assigned homework. The topics will be announced in advance.

**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. 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:
• Students missing the Plicker question or a discussion section assignment must provide acceptable documentation for the grade of 0 not to be counted.
• A 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 must provide acceptable documentation for an absence regarding missed assignments under the participation component of the course.

**Course Grading System**
The 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** (Modify highlighted as needed)

| | |
|---|---|
| Plicker Questions | 2% |
| Discussion Questions | 8% |
| Homework | 15% |
| In Class Exams | 45% |
| Final Exam | 30%* |
| Total score | 100% |

**Course Grading Scheme**
Lecture Grade 75%
Lab Grade 25%
Final Grade 100%

**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% |

*the final exam is mandatory to earn a passing grade

**Homework**
On-line homework will be assigned through WileyPlus and will be due at 11:59 pm on the corresponding due date. Look on WileyPlus to determine the dates when the assignments will be due. The exact problems will be made visible at least one week prior to the due date. **No** extensions will be given. You are allowed to work others to complete the homework. However, remember that you will take the exam by yourself, so you must understand how to complete problems individually.

**Electronic Devices**
Cell phones and other mobile devices should be set to silent mode and placed away before class begins. Use of these devices in class may result in dismissal from lecture. Laptops and tablets are permitted for note-taking purposes only.

**Laboratory**
Information regarding the laboratory portion of this course will be discussed by Mr. Thomas. The overall grade of the laboratory will be included in the final grade of CHEM 222.

**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.***

**Tentative Organic Chemistry II Lecture***

| Date | Chapter | Topic | Suggested Problems (not collected or graded) |
|---|---|---|---|
| 1/18-1/23 | 15 | Nuclear Magnetic Resonance Spectroscopy | *$^{1}$H NMR Number of Signals:* 32, 33, 35, 45, 46, 50<br>*$^{1}$H NMR Chemical Shift:* 47, 51<br>*$^{1}$H NMR Multiplicity:* 39<br>*General $^{1}$H NMR:* 37, 42, 43, 49<br>*Types of Hydrogens:* 41<br>*$^{13}$C NMR Number of Signals:* 34, 36, 40, 48<br>*Combined $^{1}$H and $^{13}$C NMR:* 53-59, 72-74, 76<br>*Multiple Choice:* 63-71 |
| 1/27-1/30 | 16 | Conjugated Pi Systems and Pericyclic Reactions | *Conjugation:* 31<br>*1,4 vs 1,2-Addition:* 34-38<br>*Diels-Alder:* 39, 40, 42-45<br>*Synthesis:* 71<br>*Mechanism:* 75<br>*Multiple Choice:* 60-65 |
| 2/1-2/3 | 17 | Aromatic Compounds | *Nomenclature:* 24, 25<br>*General Spectroscopy Problem:* 42, 46, 59, 61, 62<br>*Resonance:* 56<br>*Aromaticity:* 32-34<br>*Stability:* 36, 37, 39-41<br>*Constitutional Isomers:* 26-29<br>*$\pi$ electrons:* 30<br>*Multiple Choice:* 48-53 |
| 2/6-2/10 | 18 | Aromatic Substitution Reactions | *Halogenation: 46, 55*<br>*Nitration and Sulfonation:* 41, 42, 47<br>*Friedel-Crafts Alkylation and Acylation:* 45, 48, 61, 66<br>*Substitutents:* 43<br>*General Reactions:* 52, 64<br>*Synthesis:* 57, 60<br>*Mechanisms:* 58<br>*Multiple Choice:* 73-79<br><br>Ch 17<br>*General Reactions:* 42<br>*Synthesis:* 53, 54, 63, 67<br>*Mechanisms:* 58 |
| 2/13-2/22 | 19 | Aldehydes and Ketones | *Nomenclature:* 43, 44, 46-48<br>*Wittig Reaction:* 50, 51<br>*Grignard:* 52<br>*Reactions:* 54, 64, 83, 98<br>*Mechanisms:* 55, 58, 63, 70, 91<br>*Synthesis:* 57, 66, 67, 69, 73, 84, 85, 90<br>*Imines/Enamines:* 59-62<br>*Acetals:* 65<br>*Multiple Choice:* 60-65 |
| **2/20** | | **EXAM I** | **Ch 15, 16, 17, 18** |
| 2/24-3/13 | 20 | Carboxylic Acids and Their Derivatives | *Acidity:* 35<br>*Nomenclature:* 37, 39, 40<br>*Synthesis:* 41, 47, 48, 50, 51, 54, 59, 69, 78, 79, 90<br>*General Reactions:* 44, 45, 46, 49, 53, 63<br>*Mechanisms:* 61, 80 |

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|---|---|---|---|
| | | | *Multiple Choice:* 70-77 |
| **3/6-3/10** | | **SPRING BREAK** | |
| 3/15-3/22 | 21 | α-Carbon Chemistry: Enols and Enolates | *Resonance:* 49<br>*Enol/Enolate:* 51-53<br>*Aldol Reaction:* 61-64<br>*Condensation:* 67, 71<br>*Michael Addition:* 83<br>*General Reactions:* 74, 76, 84<br>*Synthesis:* 66, 68, 69, 73, 77, 78<br>*Mechanisms:* 75, 79, 80<br>*Robinson Annulation:* 85, 86<br>*Multiple Choice:* 89-96 |
| **3/24** | | **EXAM II** | **Ch 19, 20, 21** |
| 3/27-4/3 | 22 | Amines | *1°, 2°, 3°:* 33<br>*Basicity:* 36<br>*Nomenclature:* 37, 40<br>*General Reactions:* 57, 65<br>*Synthesis:* 45, 46, 54, 58, 68<br>*Mechanisms:* 49<br>*Multiple Choice:* 74-79 |
| 4/5-4/14 | 24 | Carbohydrates | *Fischer Projections:* 52<br>*L/D Sugars:* 42, 43<br>*Acetals:* 46<br>*Relationships:* 45, 49<br>*Haworth Projections:* 48, 53<br>*Multiple Choice:* 81-85 |
| 4/17-4/21 | 25 | Amino Acids, Peptides, and Proteins | NA |
| **4/24** | | **EXAM III** | **Ch 22, 24, 25** |
| 4/26-4/28 | 26 | Lipids | *General Reactions:* 30<br>*Mechanisms:* 43-45 |
| **5/5** | | **FINAL EXAM (4:15pm)** | |

*Subject to change as necessary

**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: $\alpha$-Carbon Chemistry
Chapter 22: Amines
Chapter 24: Carbohydrates
Chapter 25: Amino Acids
Chapter 26: Lipids