

# GENERAL CHEMISTRY FOR ENGINEERS

## CHEM 171-001 (2550) FALL 2024.

**Pre-requisite:** MATH 118 or Math Placement Test; Co-requisite CHEM 173

### Class Meetings

Days & Times			Room
CHEM 171-001 Lecture	Mo/We/Fr at 08:15-09:05 AM	Flanner Hall -	Room 007
CHEM 171-002 Discussion	Fr 09:20-10:10 AM	Flanner Hall -	Room 007

**Instructor:** Dr. Conrad A Naleway, [cnalewa@luc.edu](mailto:cnalewa@luc.edu).

Office: Chem 200-C Flanner Hall, 773-508-3115

**Office Hours:** 10:25 to 11:30 AM Fridays and 5 PM Wednesday on Zoom <https://luc.zoom.us/j/4950829636>, additional meetings maybe scheduled in advance. Added Review Sessions will be held prior to each exam

**Supplemental Instructor (SI):** Sufia Khan: [skhan96@luc.edu](mailto:skhan96@luc.edu)

**Purpose of Course:** To acquaint students with fundamental concepts of chemistry and their application in engineering science.

### Learning, Course Description and Objectives

To acquaint students with fundamental concepts of chemistry and their applications in engineering science. Multiple perspectives of matter will be used to describe and explain characteristics, properties, and relationships across the following topics: atoms and molecules, solutions, reaction kinetics, equilibria, acids and bases, reaction thermodynamics, electrochemical reactions.

Students will deepen their understanding of foundational concepts of chemistry and advance their skills in scientific problem solving, critical thinking and synthesis of concepts, such that students will be able to do the following:

- Use multiple perspectives of matter (macroscopic, particle, symbolic levels) to qualitatively describe and explain characteristics, properties, and relationships of the following: atoms and molecules, solutions, reaction kinetics, equilibria, acids and bases, reaction thermodynamics, and electrochemical reactions.
- Quantify relationships between variables controlling chemical systems.
- Solve quantitative multistep problems combining multiple concepts within the systems.
- Differentiate among closely related factors, categorize problem types, and select appropriate tools to solve these problems.
- Apply chemical principles to explain natural phenomena.

## Required Course Materials

- **Textbooks:** "Chemistry for Engineering Students", 4th edit. by Larry Brown and Tom Holme (Cengage Learning, Inc.) ISBN 978-1-337-79890-9 is required.
- Required on-line homework system (MasteringChemistry)
- Loyola email, Sakai (and integrated tools), Zoom, Gradescope and possibly additional software & online resources.
- Scientific Calculator (non-programmable, non-graphing, and independent of another device such as a phone or tablet and likely a computer)

**Lecture Notes:** Lecture notes/Handouts for each chapter will be made available electronically. Students are expected to take notes with calculations, chemical equations, and structures in the handouts as the lectures proceed. When set of notes is completed for a Chapter, a completed version will be posted or handed out.

**Other Materials:** You will need an inexpensive calculator having logarithmic (base 10 and base e), exponential, and trigonometric functions. Be sure you are familiar with your calculator and that it is in user-ready condition for quizzes and exams. **Calculators cannot be shared during exams and the covers must be removed while taking the exam. You are not allowed to have a cell phone during the exam.**

**Class Procedures:** All sections of this class will meet for lecture on Monday, Wednesday, and Friday from 8:15 to 9:05 AM in Flanner Hall 007 (basement of chemistry building). Discussion sections will be held from 9:20 AM to 10:10 AM on Friday in FH 007 as well. A discussion worksheet will be provided prior to the beginning of each discussion period, typically the night before. The instructor will demonstrate the first problem or a selected problem on the worksheet for the class. Then you will be expected to complete the worksheet problems (you may work together) and turn them to me at the end of the session. These will not be graded. Students need not hand in perfect worksheets but must make a good faith effort to complete the assignment to get full credit. Completed discussion sheets will be posted on Sakai prior to the upcoming exam.

A tentative timeline or schedule is listed at end of syllabus

**Homework Problems:** Students who expect to do well on the quizzes and exams should be able to the assigned problem in MasteringChemistry. Representative problems will also be demonstrated in lecture and worked out in the discussion sections. Students must understand the concepts behind the problems. Students who can do the indicated homework problems, discussion sheets, and understand concepts covered in class should have no problem with the exams. Homework must be turned in on a timely basis. Note there is a 20% reduction per day for late homework.

**Exams, Discussion Assignments, and Grading:** The total grade for the course is based on three 50-minute exams (9/16, 10/28, 11/18) given over the course of the semester, discussions, homework, and one final exam (12/12). Your lowest in-class exam score will be dropped. If you miss an exam due to illness or some other reason, this will be your dropped grade. If you miss another exam, then you MUST have a valid excuse (doctor's note) to have a make-up exam arranged. **Each of the top two in-class exams is worth 25% of your grade (50% of total). The final is worth 20% of your total grade. MasteringChemistry Homework will be worth 20% and Discussions are 10% of your total grade.**

**Grading Scale:** The following scale will be used to determine letter grades **A** 100-93; **A-** 92-89; **B+** 88-85; **B** 84-81; **B-** 80-77; **C+** 76-73; **C** 72-69; **C-** 68-65; **D** 64-53; **F** <52.

**Midterm Grades:** As of Fall 2024, the University requires all midterm grades to be entered in LOCUS, not just "alert" grades as in previous semesters. Typically, the LOCUS grade entry deadline is one week prior to the W deadline for the semester. **Withdraw deadline (Friday November 1, 2024 ) is the last day to withdraw from a class with a final grade of W.**

### **Student Accommodations**

If you have any special needs, please let me know in the first week of classes. The university provides services for students with disabilities. Any student who would like to use any of these university services should contact the Student Accessibility Center (SAC), Sullivan Center, (773) 508-3700. Further information is available at <http://www.luc.edu/sac/>.

See <https://www.luc.edu/sac/faculty/facilitatingaccommodations> for guidance about implementing various kinds of accommodations in a way that is appropriate to your class. The Student Accessibility Center stands ready to work with you.

**Information about Academic Integrity:** Academic integrity is the pursuit of scholarly activity in an open, honest, and responsible manner. Academic integrity is a guiding principle for all academic activity at Loyola University Chicago, and all members of the University community are expected to act in accordance with this principle. Please open and read the foldout for the third item, "Academic Integrity" in the [Undergraduate Academic Standards and Regulations](#). 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. Standards apply to both individual and group assignments.

**Exams and Academic Honesty:** Any instance of academic misconduct (including those detailed on the website provided above or in this syllabus) will be reported to the Department Chair and the academic Dean's office. **Academic dishonesty of any sort will not be tolerated. Students caught cheating during an exam or who have someone else take it for them will receive an F grade for the course.**

**Regarding the use of Artificial Intelligence:** In this course, any work you submit for credit must represent your own ideas and understanding of the assigned material. If you are uncertain about any case where your use of AI may be in conflict with university or course standards, please see me to discuss your concerns.

**Evaluation and Grading and 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. If you miss an exam due to illness or some other reason, this will be your dropped grade. If you miss another exam, then you **MUST** have a valid excuse (e.g. doctor's note) to have a make-up exam arranged.

## **NOTICE OF REPORTING OBLIGATIONS FOR RESPONSIBLE CAMPUS PARTNERS**

As an instructor, I am a Responsible Campus Partner ("RCP") under Loyola's **Comprehensive Policy and Procedures for Addressing Discrimination, Sexual Misconduct, and Retaliation** (available at [www.luc.edu/equity](http://www.luc.edu/equity)). While my goal is for you to be able to engage fully and authentically with our course material through class discussions and written work, I also want to be transparent that as a RCP I am required to report certain disclosures of sexual misconduct (including sexual assault, sexual harassment, intimate partner and/or domestic violence, and/or stalking) to the **Office for Equity & Compliance** ("OEC"). As the University's **Title IX** office, the OEC coordinates the University's response to reports and complaints of sexual misconduct (as well as discrimination of any kind) to ensure students' rights are protected.

As an instructor, I also have an obligation under Illinois law to report disclosures of or suspected instances of child abuse or neglect. <https://www.luc.edu/hr/legal-notice/mandated-reporting-of-child-abuse-and-neglect/>

The University maintains such reporting requirements to ensure that any student who experiences sexual/gender-based violence receives accurate information about available resources and support. Such reports **will not generate a report to law enforcement** (no student will ever be forced to file a report with the police). Additionally, the University's resources and supports are available to all students even if a student chooses that they do not want any other action taken. If you have any questions about this policy, you are encouraged to contact the OEC at [equity@luc.edu](mailto:equity@luc.edu) or 773-508-7766.

If you ever wish to speak with a **confidential** resource regarding gender-based violence, I encourage you to call **The Line** at 773-494-3810. The Line is staffed by confidential advocates from 8:30am-5pm M-F and 24 hours on the weekend when school is in session. Advocates can provide support, talk through your options (medical, legal, LUC reporting, safety planning, etc.), and connect you with resources as needed -- *without* generating a report or record with the OEC. More information about The Line can be found at [luc.edu/wellness](http://luc.edu/wellness).

## USE OF APPROPRIATE NAMES AND PRONOUNS

Addressing one another at all times by using one's chosen modes of address (including preferred names and gender pronouns) honors and affirms individuals of all gender identities and gender expressions. Misgendering and heteronormative language excludes the experiences of individuals whose identities may not fit within a gender binary, and/or who may not identify with the sex they were assigned at birth.

If you wish, please share your gender pronouns with me and the class when you introduce yourself, on your name placard, and/or on your Zoom profile. If you do not wish to be called by the name that appears on the class roster or attendance sheet, please let me know privately and I will work diligently to honor your wishes. My goal is to create an affirming environment for all students so that everyone can learn and engage as our full and true selves.

### **Attendance**

**Additional Dates:** Please be aware of the University Schedules which include drop dates and holidays:  
[www.luc.edu/academics/schedules](http://www.luc.edu/academics/schedules)

**Accommodations for Religious Observances:** If you have observances of religious holidays that will cause you to miss class or otherwise effect your academic work in the course, you must alert the instructor no later than Friday of Week 2 in the semester to request accommodations. ***Advance notice must be sent to the instructor through Loyola email by this deadline.***

**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. ***Advance notice must be sent to the instructor through Loyola email.***

### **Information about Accessibility Support and Student Support: Requests for Accommodation**

Loyola University Chicago provides reasonable accommodations for students with disabilities. Any student requesting accommodations related to a disability or other condition is required to register with the Student Accessibility Center (SAC). Professors will receive an accommodation notification from SAC, preferably within the first two weeks of class. 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 audio 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](mailto:SAC@luc.edu). *If you use the Testing Center, please schedule all of the tests for this class at the beginning of the semester. If a scheduled test date changes, you will still be accommodated if you had scheduled your test in advance. If you have any questions or concerns regarding the implementation of your accommodations in this course, please contact the SAC for assistance.*

**Final Exam Schedule:** The University sets the schedule for all final exams. The final will be held on Dec 12, 2024, at 9:00 AM in FH007. 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](mailto:apatricoski@luc.edu)).

**Class Attendance & Course Coverage:** Attending to the Lecture and Discussion meetings are mandatory. You will have the chance to introduce yourself to multiple classmates early in the course. Our actual pace may vary from the tentative schedule, If you miss a class for any reason, it is your responsibility to work through the content along with the lecture recording/lecture notes once it is posted, and I also suggest you contact a classmate for further discussion of the topics as you are still responsible for all material covered and assignments

**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 Fall 2024 semester, students are able to convert a class to "Pass/No-Pass" or "Audit" through Monday, September 9th. Students must submit a request for Pass/No-Pass or Audit to their Academic Advisor.

**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 Department approval for a third attempt. Students must fill out the [Permission to Register Form](#), and arrange a meeting with the Undergraduate Program Director, Assistant Chairperson, or Chairperson in Chemistry. If approved, a signed copy of this form is then sent to the student's Advising office to secure final permission for the attempt.

## **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>

## **Chem 173 Laboratory**

General Chemistry laboratory, Chem 173 should be taken concurrently with this course.

## **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. Class meetings may not be recorded without the instructor's written permission.

(e.g., <https://www.luc.edu/ool/onlineteachingguidelines/guidelinesforrecordingstudentsduringonlineclasses/>)

## **Recording of online class meetings**

In this class software will be used to record live class discussions. As a student in this class, your participation in live class discussions will be recorded. These recordings will be made available only to students enrolled in the class, to assist those who cannot attend the live session or to serve as a resource for those who would like to review content that was presented. All recordings will become unavailable to students in the class when the Sakai course is unpublished (i.e. shortly after the course ends, per the [Sakai administrative schedule](#)). Students who prefer to participate via audio only will be allowed to disable their video camera so only audio will be captured. Please discuss this option with your instructor. The use of all video recordings will be in keeping with the University Privacy Statement shown below:

## **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.

**TENTATIVE SCHEDULE:**

<b>Chemistry for Engineering Chem 171</b>			
<b>Date</b>	<b>Day</b>	<b>Topic</b>	<b>Chapter</b>
26-Aug	M	Introduction, Atoms and Molecules	1,2
28-Aug	W	Atoms, Isotopes and Molecules	1
30-Aug	F	Balancing Chemical Equations	2
2-Sep	M	<b>Labor Day NO CLASS</b>	
4-Sep	W	Limiting Reagent, Ions in Solution	2
6-Sep	F	Balancing Equations	2,3
9-Sep	M	Ions in Solution & Reactions in Solution	3
11-Sep	W	Mole-Mass	3
13-Sep	F	Volumetric Calculations	3
16-Sep	M	Exam 1 Chapters 1, 2 and 3	
18-Sep	W	Reaction Stoichiometry	4
20-Sep	F	Ideal Gas Law	5
23-Sep	M	Kinetic Theory and non-Ideal Gases	5
25-Sep	W	Gas Law Calculations	5
27-Sep	F	Quantum Mechanics	6
30-Sep	M	Electron Configurations of Atoms	6
2-Oct	W	Periodic Trends in Atomic Properties	6
4-Oct	F	Electron Configurations of Ions	6
7-Oct	M	<b>Mid-Semester Break M&amp;T Oct 7,8</b>	
9-Oct	W	Ionic, Covalent bonds and Lewis Structures	7
11-Oct	F	Drawing Lewis Structures	7
14-Oct	M	Molecular shapes	7



16-Oct	W	Hybrid orbitals	8
18-Oct	F	Molecules and Materials	8
21-Oct	M	Hess's Law	9
23-Oct	W	Specific Heat	9
25-Oct	F	Calorimetry	9
28-Oct	M	Exam 2 Chapters 4-9	
30-Oct	W	1st Law Thermo & Gibbs Free Energy	9
1-Nov	F	Spontaneous Chemical Reactions & Entropy	9
4-Nov	M	Second Law of Thermodynamics	10
6-Nov	W	Entropy	10
8-Nov	F	Thermodynamic Equations	10
11-Nov	M	Chemical Equilibrium, L $\hat{e}$ Chatlier's Principle	11
13-Nov	W	Rate Laws of Chemical Reactions	11
15-Nov	F	Temperature, Reaction Rates, and Catalysis	11
18-Nov	M	Exam 3: Chapters 9-12	
20-Nov	W	Equilibrium Constants	12
22-Nov	F	Acid-Base Equilibria	12
25-Nov	M	Solubility Equilibria	12
27-Nov	W	Thanksgiving Break	
29-Nov	F	Thanksgiving Break	
2-Dec	M	Redox Reactions and Galvanic Cells	13
4-Dec	W	Nernst Equation & Electrochemistry	13
6-Dec	F	Corrosion, Batteries ,and Electrolysis	13
12-Dec		Final Exam Thursday 9-11 AM	