## CHEM 260: Quantitative Methods in Chemistry

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.

**CLASS BEHAVIORAL EXPECTATIONS.** We strive for a learning environment of equity, respect, and inclusiveness. Therefore, all of us are expected to follow these basic principles:

* Demonstrate respect for oneself and for others.
* Treat others with dignity and behave in a way which promotes a physically and psychologically safe, secure, and supportive climate.
* Allow all community members to engage as full and active participants where the free flow of ideas is encouraged and affirmed.

**Preferred NAME aND Gender Pronouns.** This course affirms people of all gender expressions and gender identities. If you prefer a different name or pronoun than what is indicated on the class roster, please let me know. Please correct me on your preferred name and gender pronouns. If you have any questions or concerns, please do not hesitate to contact me.

**CAMPUS RESOURCES.** Loyola University is dedicated to helping students succeed in their education endeavors. There are many resources to assist you with your courses. You can find brief descriptions of the various types of support with links to the respective pages, as well as quick links to each, at <https://www.luc.edu/sas>.

## Course Information

**Course:** CHEM 260: Quantitative Methods in Chemistry (3 credit hours, lecture and discussion)

**Prerequisites:** CHEM 180, CHEM 181 and (MATH 131 or MATH 161), Pre-requisite for BIOI-BS majors: CHEM 180 and (MATH 131 or MATH 161). A student missing a co- or prerequisite may be withdrawn at any time.

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

**Lectures:** TuTh 4:15 PM – 5:30 PM, Flanner Hall Auditorium Discussion

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

* Section 001: F 9:20 AM, Mundelein Center - Room 204
* Section 002: Fr 10:25 AM – 11:15 AM, Flanner Hall 007

**LOCUS Course Description & Outcomes:**

* Lecture and discussion course designed to create foundational knowledge and proficiency in essential chemistry concepts and skills. Topics include quantitative description of gases, liquids, and solutions, kinetics of chemical reactions, chemical equilibria, acids and bases, the thermodynamics of chemical reactions, electrochemistry, and spectroscopy.
* Students will deepen their understanding of foundational concepts of chemistry and advance their skills in scientific problem solving, critical thinking, and synthesis of concepts.

**Course Coordinator:** Dr. Joerg Zimmermann (coordinator for CHEM 260, SP25)

CHEM 260 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. 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.

## Instructor Information

**Section Instructor:**Dr. Conrad A Naleway

**Office:** Flanner Hall 200-C

**Email:** cnalewa@luc.edu

**Phone:** (773) 508 3115

**Office Hours Schedule:** Flanner 200-C: Thursdays 2-3 PM

Zoom: Thurs 6:30-7:30PM [Zoom link](https://luc.zoom.us/j/4950829636)

and by appointment.

**COMMUNICATION OUTSIDE OF CLASS TIME / OFFICE HOURS**

Course-related communications between you and me are best conducted via email, using your Loyola email account. Avoid using personal email accounts as I may not receive those emails due to spam filters. Check your email often, AT LEAST ONCE A DAY.

**Office Hours Policy:**

Office hours are for EVERYONE. You can “walk in” or make an appointment ahead of time. Office hours are for those with questions, who seek advice, want to share and/or provide feedback. We can talk about college life in general, class work, class issues, your academic and professional goals, schedules, grades, a letter of recommendation you may need, or other questions or concerns. If you are unable to attend the regular office hours, I am happy to meet you at a time that works for you, just ask me (either in person or via email).

*As family matters, health issues, and assignments in other courses demand your attention, there could be moments when you need assistance. If you are experiencing difficulties inside or outside the classroom that may affect your performance in this course,* ***Please let me know! I will do my best to accommodate your specific needs to help you succeed.***

## SI Information

There are Supplemental Instruction (SI) study sessions available for this course. SI sessions are led by an SI leader, who is a student that has recently excelled in the course. Session attendance is open to all, and while it is voluntary, it is extremely beneficial for those who attend weekly. Times and locations for the SI session can be found here: [www.luc.edu/tutoring](http://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 have higher grades at the end-of-the-semester and more deeply understand course concepts than those who do not. Students are asked to arrive with their Loyola ID number, lecture notes, and textbook. **Your SI for this class will be Sufia Khan (skhan96@luc.edu)**

## Required Course Materials

* Enrollment in WileyPlus for textbook and online homework system (instructions are posted on Sakai).
* Enrollment in TopHat for in-class polling (instructions are posted on Sakai).
* A device with web browsing capability (e.g. cell phone, tablet, laptop) for in-class activities.
* Access to your LUC email and the course website (Sakai). Check here often for general information, announcements, discussion forums, and grades. YOU ARE RESPONSIBLE TO BE AWARE, WITHIN 24 HOURS, OF ALL EMAILS SENT TO YOUR LUC ACCOUNT, ANNOUNCEMENTS MADE ON THE COURSE WEBSITE, AND FOR ALL MATERIALS PLACED THERE.

## 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.

## Learning

Learning will be assessed as described in the Grading System information found later in this syllabus.

**Description and Outcomes.** Students will deepen their understanding of foundational concepts of chemistry and advance their skills in scientific problem solving, critical thinking, and synthesis of concepts, with specific emphasis on applying mathematical models to describe chemical reactions and the properties of matter. After successfully completing this course, students will be able to

* manipulate equations to solve problems symbolically, using only variables to describe the chemical and physical quantities involved,
* use scientific units , unit prefixes, and dimensional analysis properly when solving quantitative problems,
* apply the perfect gas laws, connect the molecular properties of gases to macroscopic observables, and understand deviations of real gases from the behavior of perfect gases,
* describe reaction kinetics using instantaneous and integrated rate laws, and describe the temperature-dependency of reaction rates using the Arrhenius equation,
* describe chemical equilibria via equilibrium expressions, reaction quotients, and ICE tables,
* calculate the pH of solutions of strong and weak acids or bases and buffer solutions,
* predict buffer action to neutralize strong acids or bases,
* describe titrations of strong or weak acids or bases with strong acids or bases,
* describe the solubility of salts and the common-ion effect,
* describe the thermodynamics of chemical reactions using the concepts of free energy, entropy, and enthalpy, heats of formation, and bond dissociation energies,
* describe chemical equilibria using standard free energies of reaction,
* describe the behavior of liquids and solutions, including colligative properties, using thermodynamic models,
* predict the outcome of redox reactions under standard and nonstandard conditions using standard cell potentials,

## Academic Integrity

Before beginning, let me state EMPHATICALLY that I firmly believe that 99.9% of my students (if not 100%) are basically honest people. I also know that the pressures of school, grades, family, etc. can be overwhelming at times and can lead to choices one would not normally make. That said, I view violations of Academic Integrity as a very serious offense against your fellow students and against the integrity of the university, as well as a personal affront to me. There will be zero tolerance for infractions. If you believe there has been an infraction by someone in the class, please bring it to my attention. If caught, I will pursue disciplinary action against all parties TO THE FULLEST EXTENT POSSIBLE; this may include lowering of grades, failure, suspension or expulsion.

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.](https://catalog.luc.edu/academic-standards-regulations/undergraduate/)

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.

Regarding the use of Artificial Intelligence: our Provost has expressed to “Let us all make sure we are learning and sharing best practices and not allowing AI to do the learning for us.” 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.

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. Dishonest behavior such as any form of cheating may cause to fail (grade = 0 or “F”) an assignment, examination, or the course, depending on the severity of the case. That grade assigned because of cheating cannot be “dropped”.

## Attendance

Students are expected to attend lectures and discussions. Attendance will be taken early in the term to better access if registered students are attending and to potentially motivate students to attend. However attendance will not affect your grade other than missing out on details of topics presented and potential credit for in-class participation.

## 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/travelcompetitionpolicy/>)

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.

## Information about Accessibility Support

### 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](https://www.luc.edu/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.*

## Information about Title IX

Please refer to the information at this link: [Office for Equity & Compliance's recommended syllabus language](https://www.luc.edu/equity/otherresources/resourcesforfacultystaff/syllabuslanguage/)

## Additional scheduling and dates information

* 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 24

## Final Exam

The University sets the schedule for all final exams. The final will be held on Wednesday, April 30th, 7 PM – 9 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](mailto:apatricoski@luc.edu)).

## 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 2025 semester, students are able to convert a class to “Pass/No-Pass” or “Audit” through Monday, January 27th. Students must submit a request for Pass/No-Pass or Audit to their Academic Advisor.

## Department Course Repeat Rule

Effective with the Fall 2017 semester, students are allowed up to 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](https://www.luc.edu/media/lucedu/chemistry/pdfs/Permission%20to%20Register%20Chemistry.pdf), 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.

## Additional course material and recording statements

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.

### 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](https://www.luc.edu/its/learningtechnologies/learningtechnologies/sakai/administrativeschedule/)). 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.

### 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.

## Evaluation and Grading

### Course Grading System Design

This course uses standard-based testing in conjunction with credit for participation/engagement to determine the final letter grade. The goal of the grading system is to align your course grade more accurately with your level of learning. Every grading system has pros and cons, but I believe that standard-based testing combined with the opportunity for students to reassess work without penalty is a fair and equitable way to capture your proficiency with regard to the topics of this course.

### Grading Standards

Each question in a quiz or exam will be graded according to the following rubric:

**Level Formal Meaning Interpretation**

*E* Exceeds Expectations Work is correct and complete, and carried out in a clear and convincing manner. Where applicable, work contains no incorrect or missing units.

*M* Meets Expectations Work contains minor conceptual or mathematical errors, or some minor details of the solution are omitted. Where applicable, work contains at most two incorrect or missing units.

*R* Revision Needed Work demonstrates understanding of relevant concepts and the path to obtain the solution, but contains errors, lacks details or clarity, or contains more than two incorrect or missing units.

*I* Insufficient Work contains significant errors or is incomplete.

Quiz Grading: Questions answered at the *E* or *M* level receive 1.0 points. If a question is answered at the *R* level, a revision can be submitted according to the rules listed below and the grade of the revision will replace the original grade. If a question is answered at the *I* level, it can be retaken according to the rules listed below and the grade of the retake will replace the original grade.

Midterm Exam Grading: Questions answered at the *E* level receive 1.0 points. Questions answered at the *M* level receive 0.9 points. If a question is answered at the *R* level, a revision can be submitted according to the rules listed below and if answered at the *E* or *M* level, the revised question will receive 0.9 points. If a question is answered at the *I* level, it can be retaken according to the rules listed below and if answered at the *E* or M level, the retaken question will receive 0.9 points.

Final Exam Grading: Questions answered at the *E* level receive 1.0 points. Questions answered at the *M* level receive 0.9 points. Questions answered at the *R* level receive 0.8 points. Questions answered at the *I* level receive 0.6 points.

Revision Rules To revise a question, students must briefly describe the mistake made in the original response and submit a corrected response, which will be regraded.

Retake Rules Retake questions will not necessarily be identical to the original question. For retakes of quiz questions, expect a close match between original and retake. For retakes of exam questions, the retake question will address the same topic as the original question but may differ significantly from the original question text and content. Time limits for quiz and exam retakes are set by the instructor. For quizzes, if the retake involves multiple questions from the same quiz, all must be taken in a single session. For midterm retakes, questions may be retaken in multiple sessions according to the rules set by the instructor.

Revision/Retake Deadlines for submitting revisions and time(s) and location(s) to retake questions will  
Deadlines be announced for each assignment on the course website.

### Graded Components

*The total points achieved by each student will be calculated as follows:*

1. in-class participation (see below) 50 pts (5 %)
2. homework assignments (see below) 100 pts (10 %)
3. quizzes: point percentage 5 250 pts (25 %)
4. midterm exams: point percentage 4.5 450 pts (45 %)
5. Final Exam: point percentage 1.5 150 pts (15 %)

TOTAL ACHIEVABLE POINTS 1000 pts (100%)

The following grading standards will be used (TOTAL points achieved divided by 1000, rounded to 0.1 %):

**A** 92.0 % and up **B +** 84.0 % – 87.9 % **C +** 72.0 % –75.9 % **D +** 60.0 % – 63.9 %

**A –** 88.0 % – 91.9 % **B** 80.0 % – 83.9 % **C** 68.0 % – 71.9 % **D** 56.0 % – 59.9 %

**B –** 76.0 % – 79.9 % **C –** 64.0 % – 67.9 % **F** 55.9 % and below

**IN-CLASS PARTICIPATION.** We will use TopHat for in-class instant polling. MOST polls have points awarded for participation (regardless of whether you gave the correct answer), and SOME polls may have additional points awarded for giving the correct answer. The instructor will not necessarily announce ahead of time whether points will be awarded for correct answers or not, so give every poll your full attention. The in-class participation score will be determined from the point percentage displayed in your TopHat gradebook as follows:

[in-class participation score] [TopHat point percentage]

In addition, the in-class participation score maxes out at 50 pts. There will be ample opportunity to earn polling points, and they max out at 50 pts, so missing a few polls will not affect your score. Therefore, you will not be able to make up for missed polls even if your absence from class is excused (e.g. because of illness, sporting events etc.).

**HOMEWORK.** We will use the WileyPlus homework system. Your homework score will be determined from the point percentage of graded homework displayed in the WileyPlus gradebook, rounded to the 0.1 decimal place, as follows:

WileyPlus percentage: 90.0 – 100 % | 80.0 – 89.9 % | 70.0 – 79.9 % | 60.0 – 69.9 % | 50.0 – 59.9 %  
homework score: 100 pts | 80 pts | 60 pts | 40 pts | 20 pts

**QUIZZES**

Approximately 10 quizzes (each lasting ca. 15 mins) will be given throughout the semester, tentatively scheduled as shown in the course schedule at the end of this syllabus. Quizzes missed for a **documented and legitimate reason** can be made up for without an appointment during office hours, before/after discussion sections, or by appointment at the discretion of the instructor. The make-up quiz must be taken no later than the Friday of the week following the week in which the original quiz was given.

**MIDTERM EXAMS**

There will be three midterm exams tentatively scheduled for **2/6, 3/13, and 4/10** during lecture class.

### Missed Work

**LATE/MISSED WORK.** Assignment deadlines are firm. Assume that technology will fail sometimes. Do not assume that everything will go smoothly when it comes to computers. Plan ahead. Do not leave completion/submission of assignments to the last possible moment. If you miss an assignment, contact the instructor as soon as possible, but not later than 48 hours after the assignment’s deadline and state the reason for the missed deadline. Accommodation will be provided at the discretion of the instructor on a case-by-case basis in cases of emergency circumstances (e.g. serious illness, accidents, caring for a child or other family member).

**MISSED QUIZZES OR EXAMS.** If you miss a quiz or midterm exam, contact the instructor as soon as possible via email, but not later than 48 hours after the missed quiz or exam and state the reason for your absence. Accommodation will be provided at the discretion of the instructor on a case-by-case basis for emergency circumstances (e.g. serious illness, accidents, caring for a child or other family member). No accommodation will be provided for the final exam unless you can prove you have a valid, acute reason for your absence (e.g. a police report or a doctor’s note).

### Posting of Grades

Final course grades at the end of the semester are posted only on LOCUS. Final grades are never sent via email. Each student will see an estimated midterm grade in LOCUS before the withdraw deadline.

## Course Chapters List

Unit 1: Properties of Gases

Unit 2: Chemical Kinetics

Unit 3: Chemical Equilibria

Unit 4: Properties of Acids and Bases

Unit 5: Aqueous Equilibria

Unit 6: Chemical Thermodynamics

Unit 7: Properties of Liquids and Solutions

Unit 8: Electrochemistry

Unit 9: UV/vis Spectroscopy

## Changes to Syllabus

This syllabus may be amended and/or ALTERED AT ANY TIME during the semester at the discretion of the instructor. ***You are responsible for all syllabus changes announced in class whether or not you attend.***

## Course Timeline/Schedule

PLEASE NOTE THAT THE SCHEDULE IS APPROXIMATE WITH RESPECT TO COVERAGES; WE MAY GET BEHIND OR AHEAD AS THE SEMESTER PROGRESSES. YOU ARE RESPONSIBLE FOR EVERYTHING SAID IN LECTURE, EVEN IF YOU MISS CLASS.

