

Syllabus – General Chemistry B (CHEM 102)

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 102 – General Chemistry B (3 credits: Lecture & Discussion)

Prerequisites: Chem 101 and Math 118 with a grade of C- or better, or the equivalent. A student missing a prerequisite may be withdrawn at any time.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)

Lectures: Section 022, Tuesdays and Thursdays, 4:15-5:30 pm, Flanner Hall Auditorium (133)

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

- Section 023, Wednesdays, 8:15-9:05 am, Flanner Hall 007
- Section 024, Wednesdays, 9:20-10:10 am, Flanner Hall 007
- Section 025, Wednesdays, 11:30-12:20 pm, Flanner Hall 105

Course Coordinator: Dr. Sandra Helquist (shelquist@luc.edu)

Chemistry 102 is a multi-section lecture & discussion course with common content and common outcomes across all sections. This includes the 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.

Section Instructor: Patrick L. Daubenmire, Ph. D. (Dr. D.)

Instructor Contact Information

Office: Flanner Hall 415

Email: pdauben@luc.edu

Office Hours: Wednesdays, 1:00-2:30 pm & Thursdays, 2:30-4:00 pm

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. 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 whom 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.

Required Course Materials

- Textbook: Chemistry The Central Science, Brown et. al., 14th edition (2017); eText or hard copy with access to MasteringChemistry
- Access to MasteringChemistry. The *MasteringChemistry* website (www.masteringchemistry.com) will be used for homework and other supplemental assignments and learning opportunities. The course ID for this course is: **daubenmire70480**
- In-class activity book: Chemistry, A Guided Inquiry, Part 2, Moog, R.S.; Webster, G.; Farrell, J.J. (2022), hardcopy or digital version.
- Loyola email, Sakai (and integrated tools), Zoom, & Gradescope.
- Scientific Calculator (non-programmable, non-graphing, and independent of another device such as a phone or tablet)

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 101 is necessary for in-depth study of topics in Chemistry 102. We will focus on applying a conceptual understanding of fundamental chemical principles. You will continue to learn the language of chemistry and develop your skills in scientific problem solving and critical thinking. This will serve as a foundation for further study in chemistry, other sciences and related disciplines.

The material is highly cumulative over two semesters, such that you 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: liquids and solids, solutions, reaction kinetics, equilibria, acids and bases, reaction thermodynamics, 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 problems.
- Apply chemical principles to explain natural phenomena.

Connection to the “Hungers” of Loyola University’s Transformative Education

This course seeks to assist each student in fostering hungers associated with the University’s model of transformative education¹. The study of introductory chemistry can assist in development of the specific hungers below:

- *A Hunger for Integrated Knowledge* – by building an understanding of a variety of chemical concepts and applying them to problems in many contexts.
- *A Hunger for a Moral Compass* – by examining the variables, benefits, and detriments that exist at the interface of applied science, technology, environment, and society.
- *A Hunger for a Global Paradigm* – by understanding that chemistry is a human endeavor and it resides in the tension between helping and harming life.

Primary Instructional Format – Process Oriented Guided Inquiry Learning (POGIL)

This course will not follow a traditional lecture format for delivery of course content and skill development. Instead this course will capitalize on students’ current prevailing ideas and thoughts about sets of data or presented models. Then, through guided questions about the presented information, students, working in small groups, discuss ideas and come to consensus about answers to questions. These ideas are further developed in questions that force application of the agreed upon concepts. The instructor is the guide on this journey, pointing out areas that are particularly relevant or that may need attention, and redirecting students when necessary. This format is designed based on the idea that knowledge cannot be directly transmitted from one person to another. Instead, knowledge must be built by the learner his or herself based on their own experiences and in dialog and discussion with others.

Four key ideas about learning have emerged from current research about how people learn. These include:

1. Constructing our own understanding based on our prior knowledge, experiences, skills, attitudes, and beliefs.
2. Following a learning cycle of exploration, concept formation, and application.
3. Discussing and interacting with others.
4. Reflecting on progress and assessing performance.

All of these ideas are incorporated into the design of POGIL in order to help students learn both discipline content and key process skills simultaneously, POGIL is built on this research base with the principles that most students learn best when they are:

1. Engaged and thinking in the classroom and laboratory.
2. Drawing conclusions by analyzing data, models, or examples and by discussing Ideas.

¹<http://www.luc.edu/transformativeed/>

3. Working together in self-managed teams to understand concepts and to solve problems.
4. Reflecting on what they have learned and on improving their performance.
5. Interacting with an instructor as a facilitator of learning and peer as collaborating in building understanding of the chemistry content.

To support this research-based learning environment, POGIL uses learning teams, guided-inquiry activities to develop understanding, questions to promote critical and analytical thinking, problem solving, reporting, metacognition, and individual responsibility. These components are the tools for developing process skills and the mastery of discipline content and will use a blend of venues between face-to-face and online environments.

You will work together in learning teams through a series of ChemActivities (CA) modules. The modules are designed to help you acquire knowledge and develop understanding through guided inquiry - examining data, models, or examples followed by responding to critical thinking questions (CTQ). Generally, data are presented before a theoretical explanation, whereby the CTQ lead the student through the thought processes which results in the building of a certain theoretical model. This is what makes these modules guided-inquiry. Exercises & Problems are included to reinforce the concepts being presented.

For the ChemActivities (CA) modules, you will be placed into groups of 3 or 4 students with the following designations within each group: Manager, Recorder, Technician, & Presenter. These roles you may have throughout the semester when working in groups include:

- ❖ *Manager*: The student in this role ensures that the group is functioning efficiently and progressing within the time frame set by the instructor. This student is not a supervisor, but a full participant. Additionally, this student monitors the participation of all group members to make sure all ideas have been heard.
- ❖ *Recorder*: The student in this role transcribes the agreed upon responses of the group to questions and problems. The recorder is not solely responsible for doing the work, but is responsible for accurately recording the results of the group's work. There will be times during the semester when the group's answer(s) to certain questions will be collected. The recorder submits these responses.
- ❖ *Technician*: The student in this role primarily handles calculations and the management of equipment for the group. If special operating instructions are needed for an instrument during an activity, the technician is the point person for these applications and will be trained as necessary.
- ❖ *Presenter*: The student in this role represents the group during all class discussions or during inter-group interactions. Similarly to the recorder, the presenter's responses should accurately reflect the results of the work of the group.

Class Attendance & Course Coverage

You will have the chance to introduce yourself to multiple classmates early in the course. Our actual pace may vary from this schedule: if you miss a class for any reason, it is your responsibility to work through the content, and I also suggest you contact a classmate for further discussion of the topics as you are still responsible for all material covered and assigned. Lectures will be presented using some pre-recorded content to be viewed on Panopto (via Sakai) to supplement "live" lectures & discussions. Slides/handouts/links/animations and other additional resources will be shared on Sakai. Weekly outlines and connections to learning resources will be shared via the Lessons and Resources tabs on our Sakai page.

Student and Faculty Expectations

I expect you to take ownership of your learning and to use office and SI sessions as learning resources to help you reach your desired level of achievement in the course. For this course, it is anticipated that the average independent working time (outside of class) required to learn the material in order to achieve a minimal passing grade of C- is 6-9 hours per week, but your needs will also vary depending on your prior knowledge and ability to master cumulative concepts in the course material as the semester progresses. What can you expect of me? My primary objectives are to provide you with tools, a conducive environment, much encouragement, and support to learn chemistry. Because the course objectives are based on what

students will learn, my teaching techniques include the use of pre-lecture homework, active learning and metacognition strategies, and aligned assessments to help you maximize your learning. I expect that all of us will work together!

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.

Harassment (Bias Reporting)

It is unacceptable and a violation of university policy to harass, discriminate against or abuse any person because of his or her race, color, national origin, gender, sexual orientation, disability, religion, age or any other characteristic protected by applicable law. Such behavior threatens to destroy the environment of tolerance and mutual respect that must prevail for this university to fulfill its educational and health care mission. For this reason, every incident of harassment, discrimination or abuse undermines the aspirations and attacks the ideals of our community. The university qualifies these incidents as incidents of bias.

In order to uphold our mission of being Chicago's Jesuit Catholic University-- a diverse community seeking God in all things and working to expand knowledge in the service of humanity through learning, justice and faith, any incident(s) of bias must be reported and appropriately addressed. Therefore, the Bias Response (BR) Team was created to assist members of the Loyola University Chicago community in bringing incidents of bias to the attention of the university. If you believe you are subject to such bias, you should notify the Bias Response Team at this link: <http://webapps.luc.edu/biasreporting/>

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, 2023.
- Loyola is using SmartEvals to provide instructor & course feedback. OIE will send emails near the end of the term.

Class Recording & Content Information

In general lecture, class sessions 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 can 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 *Health, 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:

Wednesday May 3rd, 2023 at 7:00pm

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).

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:

- The two lowest percentage assignments in homework and groupwork categories will be dropped.
- A missed in-class multiple choice question exam due to absence for any reason is already accommodated in the course grading system, using Option 2 (see below). A missed multiple choice exam would be the one not included in this calculation, as it would be the lowest score (0%) of the three exams.
- A missed Mastery Assessment is accommodated because re-attempts are already scheduled for these assessments. If a student misses the first attempt due to absence, then they can take the missed Mastery assessment during one of the re-attempts. No additional attempts beyond those scheduled for the whole class will be provided.

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

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

Homework	15%
Group Work	10%
<u>Exams & Assessments</u>	<u>75%*</u>
Total score	100%

*the final exam is mandatory to earn a passing grade

To reward improvement and to accommodate an exam absence, your Exams contribution to your course grade will be **automatically calculated as the higher score** between the two options listed here:

Option 1:	Mastery assessments	25%
	Average of all three in-class exams	25%
	<u>Final Exam</u>	<u>25%*</u>
	Total contribution	75%
Option 2:	Mastery assessments	25%
	Average of best two in-class exams	15%
	<u>Final exam</u>	<u>35%*</u>
	Total contribution	75%

If you miss an in-class exam for any reason, Option 2 will be used to determine your grade. It is in your best interest to prepare for and take all exams. The final exam is **mandatory**; a student who does not take the final will not pass the course.

Letter Grade Cutoffs:

Grade	Percentage
A	92.0-100
A-	88.0-91.9
B+	84.0-87.9
B	80.0-83.9
B-	76.0-79.9
C+	72.0-75.9
C	68.0-71.9
C-	64.0-67.9
D	52.0-63.9
F	0-51.9

MasteringChemistry Homework

Online Homework Sets & Activities using *MasteringChemistry* will be assigned each week. Submitted responses must be the result of your individual effort and synthesis and must be submitted by 11:59 pm on the specified date. While you can work with classmates on homework, you need to ensure that you understand how to do the assigned problems so that you are able to do them without help from others. Late assignments may not be accepted, and verification of reasons may be requested.

Group Work

Participation, group responses and reports will be an important part of the class. This work will be a combination of individual effort and group work, completed in small groups (assigned by instructor). Students must be present during class sessions in order to receive credit for these assignments.

Group Quiz content will include multiple-choice questions (MCQs) at the level of the exams and challenging free-response problems at the level of the Mastery Objectives in order to help you prepare for the grading standards upon which you will be tested individually. The purpose of working challenging problems as a group is to help you learn via cooperation, communication, and support among your classmates as you push the limits of your knowledge. Each group submits one copy of their work for each assignment. Participating group members will receive quiz completion credit if the work they submit includes a meaningful attempt at completing all of the problems.

Group reports and quizzes (as well as any other group work) are weighted equally in this category.

MCQ Exams

Three midterms and a final exam, completed individually. Allowed resources will be listed for each exam. Exams will consist of multiple-choice questions meant to test how well you understand and can apply the essential course concepts. Midterm exams focus on the recent material, including integrated concepts, and the final exam will be comprehensive and cumulative. Midterms are scheduled for the **February 16, March 16, and April 13**. We will automatically calculate your grade using the higher weighted percentage between two options listed above.

Mastery Objective Assessments

These assessments target detailed mastery objectives (MO's) for the course that will be tested individually in a Mastery format that designates: *mastered (2 points)*, *proficient (1 point)*, or *needs development (0 point)*. You will see this format on your group quizzes. The purpose of the mastery-based system is to give you multiple opportunities to demonstrate your higher-level skills of applying and analyzing chemistry concepts. These MO's will challenge you to go beyond memorization of facts and processes and transfer your understanding of essential course concepts to new scenarios, which is why you will have options to revise work and reattempt MO's for the highest designation: *mastered*. Each round of testing on these objectives, typically 3 MO's per round, will be followed by opportunities for revision of work by a specified deadline. Revised work that is complete will earn a reattempt on that particular objective. It is expected that work that does not earn Mastery credit during testing will be revised as a pre-requisite for reattempting an MO in a later round of testing. If a successfully revised MO is reattempted and mastered during a later round of testing, the higher designation replaces the lower designation previously earned. For example, if on a first attempt at an MO you earn *proficiency (1 point)*, then you earn a re-attempt and reach *mastery (2 points)*, the 2 points replaces the 1 point. Each MO can only earn a maximum of 2 points (for Mastery) counted in the grade calculation: in other words, you cannot count both Proficiency and Mastery points on the same MO, and you cannot count more than one Proficiency point on the same MO, toward your grade. Each MO can only earn one designation which can be improved with additional attempts. Rounds of testing are scheduled for **February 16, March 16, April 13, and April 27**. Specific MO dates and timing will be announced at least one week in advance. All procedures, allowed resources and requirements will be posted before each round of testing.

Course Grading System Design

There are three basic principles that we have used to design the grading system for this course. These are for you to:

1. Understand what the standards and requirements are for each letter grade so that you can choose what level of academic achievement to pursue in this course. We encourage each of you to strive for high achievement because we believe in the potential of all students to learn and improve their abilities in chemistry.
2. Expect a challenging but flexible learning environment. The standards for demonstrating your Mastery of the course material are high in each area, but the methods for meeting the standards are designed to give you multiple chances to revise and improve the quality of your work throughout the semester.
3. Learn from mistakes. Deep, connected learning involves hard work and reflection on your progress. Chemistry is a cumulative subject where the new topics build on prior knowledge and this system is designed for cycles of learning.

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. These updates will also be shared on the Sakai course page.

Course Topics & Textbook Chapters

We will not cover every topic in every chapter of the textbook this semester, but the material will usually come from the chapters listed below. Focus first on the material that is directly covered in classes and assigned or recommended. Explore the additional material in the textbook for your own interest and enrichment.

Chapter 11: Liquids and Intermolecular Forces

Chapter 12: Solids and Modern Materials

Chapter 13: Properties of Solutions

Chapter 14: Chemical Kinetics

Chapter 15: Chemical Equilibrium

Chapter 16: Acid-Base Equilibria

Chapter 17: Additional Aspects of Aqueous Equilibria

Chapter 19: Chemical Thermodynamics

Chapter 20: Electrochemistry

Chapter 21: Nuclear Chemistry