

LOYOLA UNIVERSITY CHICAGO
DEPARTMENT OF CHEMISTRY AND BIOCHEMISTRY

CHEM 301 – Physical Chemistry I
SYLLABUS, FALL 2021

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<u>Office Hours:</u>	Wed 3-5 PM, FH 418 or via Zoom	<u>phone (cell):</u>	(858) 405 7026
		<u>Web Page:</u>	sakai.luc.edu

COURSE DESCRIPTION

The objective of this course is for students to gain a firm understanding of the mathematical and physical aspects of the behavior of chemical systems, classical and statistical thermodynamics, chemical kinetics, and the properties of matter.

PREREQUISITES/COREQUISITES

CHEM 222 or 224; PHYS 112 or 112K, and MATH 162 with a grade of C- or better.

COURSE FORMAT

Lectures (TuTh 9:45 AM – 11:00 AM, Flanner Hall 105) and discussions (Tu 11:30 AM – 12:20 PM, Flanner Hall 313).

PREFERRED NAME AND GENDER PRONOUN

This course affirms people of all gender expressions and gender identities. If you prefer to be called a different name 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.

OFFICE HOURS

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

As family matters, assignments, essays, and tests in all of your 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, I WANT TO HEAR ABOUT IT. I will do my best to accommodate your specific needs to help you succeed.

COMMUNICATION OUTSIDE OF CLASS TIME AND OFFICE HOURS

Course-related communications between you and me should be conducted using the Loyola email system. Check your email often, AT LEAST ONCE A DAY. Avoid using personal email accounts, I may not receive those emails due to spam filters. You can also call or text me at my cell-phone number: (858) 405 7026.

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.

CAMPUS RESOURCES

Loyola University is dedicated to helping students succeed in their education endeavors. There are many resources to assist you with your online 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/online/resources/index.html>.

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES

If you require special accommodations due to a disability, documented or not, and are comfortable sharing this information with me, please do so at your earliest convenience. In addition, 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 located in Sullivan Center (phone: 773-508-3700, email: sac@luc.edu). Note that certain academic accommodations afforded to students, e.g. additional time on exams, require documentation and review. Further information is available at <https://www.luc.edu/sac>.

COURSE MATERIALS

1. **Atkins and de Paula: *Atkin's Physical Chemistry*, 10th or 11th Edition**, Oxford (ISBN 9780134414232)
2. **Enrollment in our course on PollEverywhere.com** (instruction on courser website).
3. **An inexpensive NON-GRAPHING, NON-PROGRAMMABLE scientific calculator.** It should be able to do logarithms, scientific notation and basic arithmetic. A TI-30 or equivalent is recommended.
4. **A laptop or smartphone (android or iphone) with web browsing capability** for in-class activities.
5. **Access to your LUC email and the course web page** (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 WEBSITE AND FOR ALL MATERIALS PLACED THERE FOR THIS COURSE.

ACADEMIC CALENDAR

You are responsible for understanding all processes and timelines associated with dropping or withdrawing from this course, file for a PASS/FAIL conversion etc. The Loyola University Chicago academic calendar that lists important dates and deadlines for the semester can be found at <https://www.luc.edu/academics/schedules>.

EXAMS

- **Midterm Exam:** There will be three midterm exams, tentatively scheduled for 10/7, 11/4, and 12/2 during class.
- **Final Exam:** The Final Exam is currently scheduled for Monday, December 13, 1:00 PM - 3:00 PM, but this may be subject to change. A missed final cannot be made up for except with verifiable proof of serious illness or a police report, or if you have four or more final exams scheduled for the same day, in which case you can petition to the Assistant Dean for Student Academic Affairs in the College of Arts and Sciences for rescheduling.
- **Quizzes:** Approximately 10 quizzes will be scheduled throughout the semester. Tentative dates are included in the schedule at the end of this syllabus; all quizzes will be announced on the course website.
- If you for any reason require special accommodations during any of the exam, contact me WELL BEFORE the exam. The day of the exam is too late.

LATE/MISSED WORK

- If you miss deadlines or exams for valid reasons (emergencies related to family, medical, legal or immigration issues) you must contact me by email within 48 hours of the exam to avoid failing the exam. In case of illness, a doctor's note is required.
- 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.

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 dishonesty can take several forms, including, but not limited to cheating, plagiarism, copying another student's work, and submitting false documents. 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 here: <http://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.

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 the severity of the case. That grade assigned because of cheating cannot be "dropped".

GRADING STANDARDS AND POLICIES:

You will be evaluated based on the following:

1. course participation	200 pts	(33%)
2. midterm exam (100 pts each, lowest score dropped)	200 pts	(33%)
3. final exam	200 pts	(33%)
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TOTAL ACHIEVABLE POINTS	600 pts	(100%)

The following grading standards will be used (based on TOTAL points achieved):

A	92.0 % and up	B +	84.0 % – 87.9 %	C +	72.0 % – 75.9 %	D	55.0 % – 63.9 %
A –	88.0 % – 91.9 %	B	80.0 % – 83.9 %	C	68.0 % – 71.9 %	F	54.9 % and below
		B –	76.0 % – 79.9 %	C –	64.0 % – 67.9 %		

COURSE PARTICIPATION

Course participation points are awarded for quizzes (max. 100 pts), homework (max. 100 pts), and in- and out-of-class activities (max 50 pts). Therefore, you have the opportunity to earn approximately 250 course participation points, however, **course participation points max out at 200 pts**. Hence, you can make up for lost points of one participation component with points from another.

POLL EVERYWHERE

We will use PollEverywhere for in-class instant polling. Every poll has points awarded for participation (regardless whether or not you gave the correct answer), and for giving the correct answer. 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 is excused (e.g. illness, sporting events etc.).

COPYRIGHT OWNERSHIP IN COURSE MATERIALS

My lectures and course materials, including presentations, tests, exams, outlines, and similar materials, are protected by copyright. I am the exclusive owner of copyright in those materials I create. I encourage you to take notes and make copies of course materials for your own educational use. However, you may not, nor may you knowingly allow others to reproduce or distribute lecture notes and course materials publicly without my expressed written consent. This includes providing materials to commercial course material suppliers such as CourseHero and other similar services.

ACADEMIC GRIEVANCES AND ACADEMIC APPEALS POLICIES

Students have the right to protection against arbitrary and capricious academic evaluations. Arbitrary and capricious means that there is no relation between the grade given and the student's performance in the class and that a reasonable person could not find that the grade was deserved. Mere disagreement or dissatisfaction with a grade does not constitute a basis for grievance. The procedure to resolve disputes can be found at: https://www.luc.edu/academics/catalog/undergrad/reg_academicgrievance.shtml.

Students also have the opportunity to request a review of circumstances that impact their academic standing or progress at the University. For example, you can appeal for a change in academic record, a finding of academic misconduct, a decision related to transfer credit, or a dismissal for poor scholarship. The procedure to request reviews can be found at <https://www.luc.edu/academics/catalog/undergrad/academicappeals>.

PHOTOGRAPHS, AUDIO OR VIDEO RECORDINGS

Any photographs taken or audio or video recordings of this course or materials of this course made by you are for the students' personal academic use only and may not be distributed in any manner (to any other individual or to the public) without written consent of the instructor (me).

In this class software may 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.

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).

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: <http://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.

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 (develop standard form on web) 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 as far in advance of the absence as possible. It is the responsibility of the student to make up any assignments. If the student misses an examination, the instructor is required to give the student the opportunity to take the examination at another time.

Accommodations for Religious Reasons

If you have observances of religious holidays that will cause you to miss class or otherwise affect 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.

Departmental Face Mask Policy

As a policy of the Department of Chemistry and Biochemistry, even in the event that the University relaxes its universal requirement for indoor mask-wearing during the Fall 2021 semester, it will remain a principle of this class section that, out of respect for the health of housemates and others in regular contact with members of our community, we properly wear face masks at all times (i.e. covering nose and mouth).

CHEM 301 Course Schedule FALL 2021 (tentative)*

Week	Dates	TUE	THU	DISC
1	8/31 9/2	introduction	perfect and real gases	problem solving
2	9/7 9/9	internal energy	first law QUIZ 1	gases
3	9/14 9/16	enthalpy	thermochemistry QUIZ 2	first law
4	9/21 9/23	entropy	third law QUIZ 3	thermochemistry
5	9/28 9/30	Maxwell relations	free energy QUIZ 4	entropy
6	10/5 10/7	phase diagrams	Midterm 1	review
7	10/12 10/14	MIDSEMESTER BREAK no class	the phase rule QUIZ 5	MIDSEMESTER BREAK no discussion
8	10/19 10/21	phase transitions	thermodynamics of mixing QUIZ 6	phase diagrams
9	10/26 10/28	liquids	solutions QUIZ 7	mixing
10	11/2 11/4	colligative properties	Midterm 2	review
11	11/9 11/11	phase diagrams of binary mixtures	activity QUIZ 8	colligative properties
12	11/16 11/18	equilibria	equilibrium constants QUIZ 9	binary mixtures
13	11/23 11/25	Le Chatelier's principle	THANKSGIVING HOLIDAY no class	equilibria
14	11/30 12/2	integrated rate laws	Midterm 3	review
15	12/7 12/9	reaction mechanisms	review QUIZ 10	kinetics
FINAL WEEK		FINAL EXAM Monday, 12/13, 1 PM to 3 PM (date and time subject to change)		

* 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.

Required Readings

Atkins, de Paula, *Physical Chemistry*, 10th Edition

Chapter 1 The Properties of Gases	1A	The perfect gas	entire section
	1C	Real gases	1C.1a, 1C.2a-b
Chapter 2 The First Law	2A	Internal energy	entire section
	2B	Enthalpy	entire section
	2C	Thermochemistry	2C.1a-c, 2C.2a
	2D	State functions and exact differentials	2D.1, 2D.2a-b
	2E	Adiabatic Changes	entire section
Chapter 3 The Second and Third Law	3A	Entropy	entire section
	3B	The measurement of entropy	entire section
	3C	Concentrating on the system	3C.1a-d, 3C.2a
	3D	Combining the first and second laws	3D.1a-b, 3D.2a-c
Chapter 4 Physical Transformations of Pure Substances	4A	Phase diagrams of pure substances	entire section
	4B	Thermodynamic aspects of phase transitions	4B.1a-b, 4B.2a-d
Chapter 5 Simple Mixtures	5A	The thermodynamic description of mixtures	entire section
	5B	Properties of solutions	entire section
	5C	Phase diagrams of binary systems	5C.1a-b, 5C.2a-b
	5E	Activities	5E.1, 5E.2a-b, 5E.3
	5F	The activities of ions	5F.1a-b
Chapter 6 Chemical Equilibrium	6A	The equilibrium constant	entire section
	6B	The response of the equilibria to the conditions	entire section
Chapter 20 Chemical Kinetics	20A	The rates of chemical reactions	entire section
	20B	Integrated rate laws	entire section
	20D	The Arrhenius equation	entire section
	20E	Reaction mechanisms	entire section

DISCLAIMER

THIS SYLLABUS MAY BE AMENDED AND/OR ALTERED AT ANY TIME DURING THE SEMESTER AT THE DISCRETION OF THE INSTRUCTOR.