

LOYOLA UNIVERSITY CHICAGO
DEPARTMENT OF CHEMISTRY AND BIOCHEMISTRY

CHEM 306 – Physical Biochemistry Lab
SYLLABUS, SPRING 2023

INSTRUCTORS/TEACHING ASSISTANTS

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office hours:	Tue 1 PM-2 PM FH 418 or zoom*	Tu, Th 12:30-1PM FH 428 or zoom*	Mo 10-11 AM FH 301or zoom*	Th 3-4 PM SJH 102 (STEM center) or zoom*

*see Sakai course website for zoom links

COURSE DESCRIPTION

This laboratory course will introduce apparatus and analysis used in experimental physical chemistry for biochemistry students.

PREREQUISITES

CHEM305 with a grade of C- or better. Restricted to biochemistry majors.

COURSE FORMAT

Laboratory course, Flanner Hall 02. Section 1: Tu 8:30 AM to 12:20 PM, Section 2: Th 8:30 AM to 12:20 PM, Section 3: Fr 8:30 AM to 12:20 PM.

COURSE LEARNING OUTCOMES

Upon completion of this course, students will be able to:

- apply concepts of physical chemistry, including partial molar properties, viscosity, colligative properties of solutions, UV/vis and fluorescence spectra of organic molecules, FRET, and enzyme kinetics,
- understand the limits of models assuming ideal behavior and how to account for deviations from ideal behavior
- perform experiments in a precise and accurate way and detect and correct gross experimental errors while performing an experiment,
- properly keep a laboratory notebook,
- analyze experimental data and perform error calculations using Microsoft Excel,
- prepare written reports that describe experimental methods and results, and discuss the experimental work,
- orally present experimental work using Microsoft Powerpoint.

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).

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.

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.

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>.

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.

COURSE FACE MASK POLICY

Unless otherwise stated by the instructor, wearing of a proper face mask covering nose and mouth is required for all students during all class meetings and during office hours, out of respect for the health of students, faculty, and staff, their families and others in regular contact with members of our community and even if the University has less stringent requirement for indoor mask-wearing. Intransigent non-compliance may be reported to the Office of Student Conduct & Conflict Resolution.

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES

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.

REQUIRED COURSE MATERIALS

1. **Lab notebook.**
2. **Protective glasses and a lab coat.**
3. **Access to Microsoft Excel, Microsoft Powerpoint, and a word processing software with an equation editor (e.g. Microsoft Word).**
4. **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.

RECOMMENDED COURSE MATERIALS

1. **Garland, Nibler, Shoemaker: Experiments in Physical Chemistry** (any recent edition).

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>.

COURSE STRUCTURE

The first lab period is dedicated to lab and safety procedures, preview of the semester, and an exercise in recording and analysis of experimental data. For the next twelve lab periods, you will work in groups of two, with groups staying together for the entire semester. You will perform six experiments, each over two lab periods. After finishing an experiment, a separate report from each partner is required. One partner will submit a written report and the other will present an oral report (see below). The last lab period is used for checkout and final presentations.

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.

LAB SAFETY

You must wear protective glasses and a lab coat, wear clothing covering your arms and legs, and tie back your hair whenever you are in the lab. Eating and drinking in the lab are not allowed. Any safety violations can lead to additional and significant penalties including lowering of grades and failing the course.

LAB CONDUCT

You are expected to:

- follow safety and waste disposal procedures
- handle lab equipment with care
- behave cordially toward and collaborate with your fellow students
- clean up your workspace before you leave

Lab conduct violations may lead to point deductions for the respective experiment at the discretion of the instructor.

GRADING STANDARDS AND POLICIES:

You will be evaluated based on the following:

1. 6 lab notebook pages (50 pts each, lowest two scores will be dropped)	200 pts	(33%)
2. 3 oral reports (100 pts each, lowest score dropped)	200 pts	(33%)
3. 3 written reports (100 pts each, lowest score dropped)	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 %	

LAB NOTEBOOKS

For each experiment, you must submit a PDF copy of your lab notebook pages on the course website by the deadline. Your notes must be handwritten and easy to follow. If you find your actual notes from the lab period insufficient, you can submit a rewritten version of your notes instead. At a minimum, your notes should include:

- title and objective of the experiment
- potential safety hazards
- waste disposal
- a description of the actual experimental procedure, the experimental apparatus, and materials used in the experiment
- all collected data

Note: While you are working in pairs and for most experiments there will be a division of labor among the two students, the lab notebook of each student should include all of the work, not just your part.

WRITTEN REPORTS (200 pts)

All written reports must be submitted as one PDF file on the course website by the deadline. Detailed instructions for written reports are posted on the course website.

ORAL REPORTS (200 pts)

Oral reports will be given usually during the lab period following the conclusion of the experiment, unless you and your grader agree on another time. They consist of a 15 min presentation followed by a 5-10 min Q&A session. You must prepare slides in PowerPoint format. Files must be uploaded by the deadline, and you must use the previously submitted slides for your presentation. Detailed instructions for oral reports are posted on the course website.

ATTENDANCE

This is a lab course, so attendance is mandatory. Should you miss lab period due to illness, religious holidays, or university-sanctioned events, let your instructor know as early as possible. For unexcused absences, you will lose 15 points per missed lab period, to be deducted from your report score for the experiment. Even if you miss a lab, you still need to submit a lab report, either based on the data collected by your lab partner, or data provided by the grader. Consult with your grader for details.

LATE/MISSED WORK

For written and oral reports, a penalty of 5 pts will be applied for each day or fraction of a day delay of uploading the report or presentation to the course website. Assume that technology will fail sometimes, plan ahead, and do not leave completion/submission of your report to the last possible moment. Should you have a legitimate reason for missing a deadline, contact your grader before the deadline and ask for permission to submit late.

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

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, Chegg 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>.

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.

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.

In addition, 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.

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 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.

DISCLAIMER

This syllabus may be amended and/or altered at any time during the semester at the discretion of the instructor.

COURSE SCHEDULE, SPRING 22 (ALL SECTIONS)

LIST OF EXPERIMENTS

	Experiment	Resources	Grader
A	Partial Molar Volume	Garland, Experiment 9	TA
B	Intrinsic Viscosity of Polyvinyl Alcohol	Garland, Experiment 27	TA
C	Enzyme Kinetics	Loyola Faculty / JASCO	Pecak
D	Differential Scanning Fluorometry	Loyola Faculty	Pecak
E	UV/vis Absorption	Loyola Faculty	Zimmermann
F	Fluorescence Quantum Yield and FRET	Loyola Faculty	Zimmermann

ORDER OF EXPERIMENTS

Group	Exp. 1	Exp. 2	Exp. 3	Exp. 4	Exp. 5	Exp. 6
1	A	B	E	F	C	D
2	B	A	F	E	D	C
3	C	D	A	B	E	F
4	D	C	B	A	F	E
5	E	F	C	D	A	B
6	F	E	D	C	B	A

SCHEDULE

Week	Dates	TUE AM	THU AM	FRI AM/PM
1	1/16	introduction	introduction	introduction
2	1/23	Exp. 1	Exp. 1	Exp. 1
3	1/30	Exp. 1	Exp. 1	Exp. 1
4	2/6	Exp. 2	Exp. 2	Exp. 2
5	2/13	Exp. 2	Exp. 2	Exp. 2
6	2/20	Exp. 3	Exp. 3	Exp. 3
7	2/27	Exp. 3	Exp. 3	Exp. 3
8	3/6	SPRING BREAK		
9	3/13	Exp. 4	Exp. 4	Exp. 4
10	3/20	Exp. 4	Exp. 4	Exp. 4
11	3/27	Exp. 5	Exp. 5	Exp. 5
12	4/3	Exp. 5	Exp. 5	Good Friday no lab
13	4/10	Exp. 6	Exp. 6	Exp. 5 Exp. 6
14	4/17	Exp. 6	Exp. 6	Exp. 6
15	4/24	checkout	checkout	checkout