

## Chemistry 373 - Biochemistry Laboratory II Spring 2022 Syllabus

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**Teaching Assistants:** Jaina Bhayani ([jbhayani@luc.edu](mailto:jbhayani@luc.edu))  
Gaby Ramirez-Martinez ([gmartinezramirez@luc.edu](mailto:gmartinezramirez@luc.edu))

### Laboratory Sections:

Chem 373-001: Wed 8:30 AM – 12:20 PM in Flanner Hall 016 (Jessica)

Chem 373-003: Wed 1:40 PM – 5:30 PM in Flanner Hall 016 (Agnes)

Chem 373-004: Wed 1:40 PM – 5:30 PM in Flanner Hall 002 (Agnes)

### Discussion Sections:

Chem 373-005: Mon 9:20 AM – 10:10 AM in Flanner Hall - Room 007 (Jessica)

Chem 373-006: Wed 5:50 PM – 6:40 PM in Flanner Hall - Room 007 (Agnes)

**Note: Discussion and laboratory sections are linked, and students must attend the discussion section linked to their lab.**

**Office Hours:** You may contact your instructor or teaching assistant during their regularly scheduled Office Hours by clicking on the links below (or on Sakai) during the designated times to join the Zoom meeting below. You can also email to schedule an alternative appointment.

**Agnes:** [Tuesdays & Thursdays 12:30 PM – 1:00 PM](#)

**Jessica:** Mondays 1:30 PM – 2:00 PM in LSB 124; [Mondays 7:00 PM – 7:30 PM](#); [Tuesdays & Thursdays 4:15 PM – 4:45 PM](#)

**Jaina:** [Tuesdays 10:00 AM – 10:30 AM](#)

**Gaby:** [Thursdays 1:00 PM – 2:00 PM](#)

If you are unable to contact the Instructor directly, or by voice or e-mail, you may leave a phone message with the Chemistry Departmental Office, (773) 508-3100.

**Course Pre-requisite: CHEM 372**

**Course Description and Objectives:** The purpose of this second biochemistry laboratory course is to continue research on ADP-Glucose Pyrophosphorylase from *Escherichia coli* and the mutants. This course will mainly focus on characterization of the protein and the mutants. Each two-student team will be working on a recombinant ADP-glucose pyrophosphorylase from *Escherichia coli* and one mutant (either N124A or D126A).

### The objectives of the course are to:

- learn the theoretical foundations for the method used
- understand the applicability of the biochemical methods
- observe and record data accurately
- learn to present data, results and conclusions
- develop the ability to think scientifically and evaluate information critically

In the second part of biochemistry laboratory, students will focus on characterizing ADP-Glucose Pyrophosphorylase and its mutants (N124A and D126A). There is a moderate risk of facing challenges. Some of the pedagogical goals are inspired by Kuhn, M.L., Figueroa, C.M., Aleanzi, M., Olsen, K.W., Iglesias, A.A. and Ballicora, M.A. (2010) "Bi-national and interdisciplinary course in enzyme engineering" *Biochem.Mol.Biol.Educ.* **38**:370-379. [<http://dx.doi.org/10.1002/bmb.20438>]

*... "that students work on real scientific problems during the laboratory sessions rather than performing a series of well-established experiments. While this may lead to unexpected difficulties, it is extremely advantageous for the student to learn how to approach a problem in an actual research environment"*

Student teams are expected to perform experiments during their normally scheduled laboratory session time. Unfortunately, no student will be allowed to do work outside of their laboratory section.

A weekly 50-minute discussion section will be used for the discussion of procedures, results, and conclusions. The discussion will be conducted as an open forum of questions and answers between students and the instructor. With the instructor's help, the students will compare the methods that they have found in the original literature and determine which methods are best suited for the lab. Upon the completion of the course, the students should draw conclusions and insights about the structure-function relationships of this enzyme.

#### **Required Materials:**

- **Safety glasses/goggles:** No student will be permitted to conduct research without an eye protection. If you need to wear the regular glasses, then you will need to put the goggles on top of your glasses.
- **Lab coat:** The assays performed in this lab use a dye that will stain clothing. Wearing a lab provides an additional barrier in case of chemical spills.
- **Gloves:** Disposable, nitrile gloves will be provided in the lab and should be worn when performing all experiments.
- **Face mask:** All members of the lab will attend class with a mask on and keep it on throughout the entire lab/discussion. If a break is needed, students should step outside for a short break, but only when their experiment is at an appropriate stopping point.
- **Laptop:** A device capable of using the full version of Microsoft Excel and connecting to the wifi is required in the lab so data can be analyzed as experimental assays are run.

**Safety:** Laboratory safety is everyone's responsibility. By registering for this course, students agree to abide by all of the safety precautions, information and rules provided in lab. Additionally, appropriate clothing must be worn that minimizes potential chemical contact with skin. Shoes that adequately cover the entire foot are required. Sandals, open-toes shoes, perforated shoes, open-backed shoes are not acceptable. No skin can be exposed on your feet or legs, so clothing that covers the body from the waist down (including ankles) should be worn. Failure to dress appropriately result in a student's dismissal from the lab.

#### **Tentative order of experiments:**

Lab 1: Check-in/Kinetics Prep

Labs 2 and 3: Kinetics on WT and mutant ADP-glucose pyrophosphorylase (AGPase)

Labs 4 and 5: WT and mutant Fructose 1,6-bisphosphate (FBP) curves

Labs 6 and 7: WT and mutant Adenosine Triphosphate (ATP) curves

Labs 8 and 9: WT and mutant Adenosine 5'-monophosphate (AMP) curves  
Lab 10: Thermal Stability of WT and mutant AGPase from 30-80 °C  
Lab 11: Protein Thermal Shift of WT and mutant AGPase using qPCR  
Labs 12 and 13: WT and mutant Pyruvate curves

**Attendance/Participation:** Participation is mandatory for ALL labs. Experiments in this course will be performed individually. In case of an absence, students must contact their instructor within 24 hours to determine a course of action for missed lab work. Students with lab absences without a confirmed reason will be deducted lab performance points.

### **Lab Reports:**

There will be 5 lab reports written over the course of the semester. After completing a set of labs, each student will be required to turn in the lab report at the start of next lab period. Note: results for labs 10 and 11 will be combined in the last lab report. The pyruvate results will not be discussed in a separate lab report, but will be included and evaluated in the final paper.

**Lab report (each worth 10 pts) should have the following sections:**

**I. Title**

**II. Objective:** give a one-or-two sentence statement of the purpose of the experiment

**III. Procedure:** describe briefly the kinetics setup

**IV. Results/Calculations:** equations, sample calculation, charts, figures, graphs etc. which can be used to effectively present your results.

**V. Discussion/Conclusion:** the analysis and interpretation of your results. What do results mean? How do they relate to the objective of the experiment?

**The lab reports must be typed.**

*A two point deduction will be applied for each 24-hour period that a lab report is turned in late. Since lab reports will be submitted via Sakai, the deadlines apply regardless of lab attendance. Reports are always due 1 week after completing the set of labs.*

### **Grade Allocation:**

**50% Lab Reports.** We expect you to follow a particular format for your research records, which is illustrated in this syllabus. There will be five lab reports for the semester, and **due dates and submissions will be on Sakai.**

**5% Laboratory Performance.** The TA, in consultation with the instructor, will assess this score, which will be based on proper use of instrumentation, good laboratory and leadership skills, observation of safety techniques, and on-time attendance. You are expected to arrive to the laboratory each week on time and be prepared.

**10% Excel sheets with Data & Analysis.** It is essential this semester that you present your data clearly. Each experiment and/or kinetic trial needs to have a date, title, sample's name (ex. T79A), and sample's concentration. Also, each trial has to have a list of what was added to each tube and results etc. This data will be uploaded on Sakai after the completion of each

set of experiments.

**15% Discussion Section.** A lab discussion is different than a lecture discussion in that much of the relevant background, prelab, and data analysis information are primarily only discussed then. This allows enough time for everyone to perform the experimental work during the lab time. The discussion score will be determined by the student's preparation, participation, and performance on quizzes and assignments done in the weekly discussion class. *There are no make ups for discussion absences.*

**20% Final Paper.** This will be the continuation and expansion of your scientific paper from biochemistry laboratory 1. **The due date will be April 27<sup>th</sup> by 5 PM.** *If the final papers are submitted late, a two point deduction will be assessed for each 24 hour-period of tardiness.*

**Class Grades:**

A = 100-88 %	A- = 87-83 %	
B+ = 82-78 %	B = 77-73 %	B- = 72-68 %
C+ = 67-63 %	C = 62-58 %	C- = 57-53 %
D+ = 52-48 %	D = 47-40 %	F = Less than 40 %

**Interactions with TAs:** In order to increase the amount of individual assistance you receive in lab, Teaching Assistants will participate in delivering this course. If at any time during the semester, you have any questions or concerns about the behavior of your Teaching Assistant, please contact the Instructor.

**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: <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.*

*Academic dishonesty can take several forms, including, but not limited to cheating, plagiarism, copying another student's work, and submitting false documents.*

Any instance of dishonesty (including those detailed on the website provided above) will be reported to The Chair of The Department of Chemistry & Biochemistry, who will decide what the next steps may be. The penalty may include a grade of zero for that assignment and/or failure of the course.

**Health, Safety, and Well-Being On-Campus:** Please be familiar with and adhere to all policies and protocols posted on the Campus Info & Resources site: <http://www.luc.edu/healthsafetyandwellbeing/campusinforesources/>

**Spring 2022 Masking Requirement:** It is Departmental policy that, even in the event the University relaxes its universal requirement for indoor mask-wearing during the Spring 2022 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, in this class, masks will be properly worn at all times (e.g., over nose and mouth).

**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.

**Student Accommodations:** The Student Accessibility Center (SAC, formerly known as SSWD), Sullivan Center (773-508-3700), <http://www.luc.edu/sac>, has the mission “to support, service, and empower Loyola University Chicago students with disabilities” and to “Partner with faculty and staff to provide opportunities for collaboration, professional development, personal growth, and staff interaction, as they relate to students with disabilities.” Please direct all questions concerning accommodations of disabilities to the Student Accessibility Center. Academic accommodations afforded to students require documentation and review. The Student Accessibility Center will issue accommodation letters for registered students to present to their instructors; accommodations are not active until students present these letters to their instructors. If students’ accommodations involve attendance or deadlines, instructors and students will jointly complete and execute an Agreement Form articulating their terms. See <https://www.luc.edu/sac/faculty/facilitatingaccommodations/> for guidance about implementing various kinds of accommodations in a way that is appropriate to your class. The Student Accessibility Center stands ready to work with you.

**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 discussion or laboratory classes 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 the 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. (<https://www.luc.edu/athleteadvising/attendance.shtml>)

**Accommodations for Religious Reasons:** If you have observances of religious holidays that will cause you to miss class/lab 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.

**Recording of Zoom 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 course has concluded. Students will be required to turn on their cameras at the start of class. Students who have a need to participate via audio only must reach out to the instructor to request audio participation only without the video camera enabled. 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.