



## Chemistry 373 - Biochemistry Laboratory II Spring 2021 Syllabus

**Instructor:** Agnes Pecak ([aorlof@luc.edu](mailto:aorlof@luc.edu))

Location: FH 002 or FH 016. **Please check Locus for your exact location.**

**Teaching Assistants:** Nick Kaley ([nkaley@luc.edu](mailto:nkaley@luc.edu)), Yuanpu Niu ([yniu2@luc.edu](mailto:yniu2@luc.edu))

### Laboratory Sections:

Chem 373-001: Wed 8:10 AM – 12:00 PM in Flanner Hall 002 TA: Yuanpu Niu MT: T79A

Chem 373-002: Wed 8:10 AM – 12:00 PM in Flanner Hall 016 TA: Nick Kaley MT: T79A

Chem 373-003: Wed 1:30 – 5:20 PM in Flanner Hall 016 TA: Yuanpu Niu MT: T79S

Chem 373-004: Wed 1:30 – 5:20 PM in Flanner Hall 002 TA: Nick Kaley MT: T79S

**Loyola Policy:** For the safety of everyone attending this course, there will be assigned seating and attendance will be taken. This will assist with Covid-19 contact tracing should it become necessary. We trust our students will understand and cooperate with this policy.

**Important note:** Students will work in groups of two. However, each person from the group will be coming every other week to complete the experiment. Groups will be chosen by the instructor and listed in Sakai. **Tentative schedule is provided in Sakai under Announcements and Syllabus.**

### Discussion Section: Discussion and laboratory sections are linked.

Chem 373-005: All assignments such as lab reports and discussion part will be presented in “in person” lab sections at the start of each lab and via Sakai. Discussion section will be used for covering procedures, results, and conclusions. All assignments such as lab reports, announcements, grades will be posted under Discussion section (Chem 373-005).

### Pre-requisite: Chemistry 372

### Description and Objectives:

This laboratory course is designed to simulate a research project in which molecular biology techniques and biochemistry are integrated. Those techniques are used as important tools to help solve questions in enzyme structure and function. The course theme involves an investigation on the relationship between protein structure and function of the ADP-glucose pyrophosphorylase (ADP-Glc PPase) from *Escherichia coli*.

#### The objectives of the course are to:

- 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 have “hands-on” experience of experiments that will involve expression, purification and characterization of ADP-Glucose

Pyrophosphorylase and its mutants (T79A and T79S). 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.

### **Required Materials:**

- Safety glasses: 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.
- Mask. Each student will have to come with a mask on and keep it on throughout the lab
- Gloves: they will be provided in lab, free of charge
- Lab coat is required. You can purchase one at Loyola Bookstore
- Notebook (the one used for Chem 372)
- Laptop with high speed internet connection
- Appropriate clothing must be worn that minimizes the potential chemical contact with your skin. No skin should be exposed on your feet or legs, so clothing that covers and protects your body from waist down should be worn.
- CamScanner or Genius Scan phone app, for iPhone or Android. This is a free app that will convert a phone picture to a PDF file. It may be necessary to take pictures of your Composition notebook pages and upload them for grading as a PDF file.

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

- Lab 1: Check in/ Mutagenesis Part 1; Luria Broth/Kana plates prep
- Labs 2: Mutagenesis Part 2; Buffer Prep for Lab 4
- Lab 3: DNA Purification/ Gel Electrophoresis WT/MT (WT= Wild Type MT=Mutant)
- Labs 4: Sonication; Purification WT/ M T; Kinetics Prep
- Lab 5: SDS-PAGE; Kinetics WT/MT
- Labs 6a: Kinetics; FBP Curve MT/WT
- Labs 6b: Kinetics: ATP Curve MT/WT
- Lab 7a: Kinetics: AMP curve MT/WT
- Lab 7b: Thermal Stability MT/WT **or** Protein Thermal Shift (qPCR)

### **Lab Reports:**

- Lab Report 1: Mutagenesis Part 1 and 2
- Lab Report 2: DNA Purification/Digestion and Gel Electrophoresis
- Lab report 3: Sonication/Protein Purification
- Lab Report 4: SDS-PAGE
- Lab Report 5: Specific Activity Comparison of WT/MT: Malachite Green Assay and

results for Fructose 1,6-bisphosphate (FBP Curve)

Adenosine Triphosphate (ATP) curves, Adenosine 5'-monophosphate (AMP) curves and Thermal Stability results will be graded in the Final Paper.

**Lab report should have the following sections:**

**I. Title**

**II. Objective:** give a one-or-two sentence statement of the purpose of the experiment. Provide a brief discussion of the theory behind the experiment.

**III. Materials and Methods:** this section should resemble materials and methods in a scientific article. Review Chem 372 discussion section that covers Materials and Methods.

**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? Did you achieve your proposed goals.

**The lab reports must be typed.**

*A one 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.*

*Additionally, there will be 2 point deduction on a lab report for missing one of the lab sessions covered in that report if no valid reason for the absence.*

**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.

**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 provided in Sakai.**

**10% Laboratory Performance/ Attendance.** 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.

**20% Notebook Entries and Excel sheets with Data & Analysis** The notebook entries should have student's name on the top of each page used, title, brief purpose of the lab, procedure, calculations, data, results/conclusion. Review a tentative schedule posted in Sakai to see when each notebook entry needs to be submitted. Notebook entries should be scanned

using one of the apps mentioned under required materials. Lastly, use ONLY the right-side page of the notebook. Leave the left side for any notes or corrected corrections.

**20% Final Paper.** Scientific Paper due **Friday, April 30<sup>th</sup> by 5 pm\***.

*\*If the final papers are submitted late, one-point deduction will be assessed for each day 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 %

**Office Hours:** Outside of class, you may contact Agnes Pecak during regularly scheduled Office Hours.

Agnes: **Mondays 1PM – 2 PM via ZOOM.** Zoom link will be provided in Sakai. The office location, telephone number, and e-mail address are: Flanner Hall 428, (773) 508-2883 [aorlof@luc.edu](mailto:aorlof@luc.edu)

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.

**Sakai:** This site contains current information for experiments, assignments and procedures and scores.

**Academic integrity:** The standards of the College of Arts and Sciences will be followed. In case a violation is detected, the particular assignment may receive a grade of zero.

Course content is designed for use ONLY by students in this course. All materials are subject to privacy and copyright laws. Students are NOT allowed to share any course resources, such as , PowerPoints, quiz/test/exam questions, documents, etc. with anyone nor post to any outside media. The Chem 373 syllabus and all course materials are NOT allowed for distribution outside of class nor outside of the University. Uploading, posting, copying, or sharing electronic/non-electronic Chem 373 materials outside of class [i.e. share sites] is NOT allowed. If discovered that a student completes such action, the Dean and University get notified immediately.

**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 taken to your Academic Advisor in Sullivan to secure final permission for the attempt.

## **Student Accommodations**

If you have any special needs, please let your instructor know the 1<sup>st</sup> week of classes. The university provides services to students with disabilities. Any student who would like to use any of these university services should contact the Student Accessibility Center (SAC), Sullivan Center, (773) 508-3700. Further information is available at <http://www.luc.edu/sac/>

## **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 will be reported to The Chair of The Department of Chemistry & Biochemistry who will decide what the next steps may be.

## **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 (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.

(<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.

