

Chemistry 373 - Biochemistry Laboratory II Spring 2019 Syllabus

Instructors: Agnes Pecak and Jessica Eisenberg

Teaching Assistants: Patrick Zeniecki, Arseniy Butrin

Laboratory Sections:

Chem 373-001: Wed 8:30 AM – 12:20 PM in Flanner Hall 002 (Jessica)

Chem 373-003: Wed 1:40 – 5:30 PM in Flanner Hall 002 (Agnes)

Chem 373-004: Wed 1:40 – 5:30 PM in Flanner Hall 016 (Agnes)

Discussion Sections:

Chem 373-006: Mon 9:20 AM – 10:10 AM in Flanner Hall - Room 007 (Jessica)

Chem 373-005: Mon 11:30 AM – 12:20 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.

Pre-requisite: Chemistry 372

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.

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 (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.

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: 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 is optional, but recommended
- One laptop is required to be brought to lab per group
- 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.

Tentative order of experiments:

- Lab 1: 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

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 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. Reports are always due 1 week after completing the set of labs.

Additionally, there will be a one or 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 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 (per group). 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 absences.*

20% Final Paper. This will be the continuation and expansion of your scientific paper from biochemistry laboratory 1. **Due date will be April 24th by 12 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 % 52-48 |
| 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 or Jessica Eisenberg during regularly scheduled Office Hours.

Agnes: Mon 10:00 AM - 11:00 AM. The office location, telephone number, and e-mail address are: Flanner Hall 428, (773) 508-2883 aorlof@luc.edu

Jessica: Mon 2:30 PM - 3:15 PM and Fri 10:30 AM - 11:15 AM. Office location, telephone number, and email address are: Flanner Hall 104, (773) 508-8714, jeisenberg2@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 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 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 1st 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.