

Chemistry 373 - Biochemistry Laboratory II Spring 2017 Syllabus

Instructors: Agnes Orlof and Jessica Eisenberg

Teaching Assistants: Jonathan Hill and Daniel Catlin

Laboratory section: Th 8:30 AM – 12:25 PM or Fri 1:40 PM -5:30 PM in Flanner hall 2 or 016

Discussion section: Mo 9:25 AM – 10:10 AM or 10:25AM - 11:15 AM in Flanner Hall - Room 7

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 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 (L33A and L33V). 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; and
- Laboratory notebook or Laptop is required
- 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 and 2: Kinetics on Wt and mutant

Lab 3 and 4: Thermal Stability from 30-80 °C

Lab 5 and 6: Fructose 1, 6-bisphosphate (FBP) curve

Lab 7 and 8: Adenosine Triphosphate (ATP) curve

Lab 9 and 10 Adenosine 5'-monophosphate (AMP) curve

Lab 11: Pyruvate curve

Lab reports:

After completing a lab, each student will be required to turn in the lab report at the start of next lab.

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. Conclusion/Discussion: 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. Results/Calculations are allowed to be hand-written.

If you miss a lab, the lab report will be due at the start of your next lab and half-credit will apply.

Grade Allocation:

50% Lab reports. We expect you to follow a particular format for your research records, which is illustrated in this syllabus. Due dates will be posted on Sakai.

10% 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 and observation of safety techniques. You are expected to arrive to the laboratory on time and be prepared.

10 % Laboratory notebook and/or Laptop Excel Sheets. It is essential this semester that you present your data clearly. Each experiment or kinetic trial needs to have a date, title, sample's name (ex. L33A), and sample's concentration. Also, each trial has to have a list of what was added to each tube and results etc. Since much of the data requires calculations, presenting all of the data in worksheets using Excel has proven to be successful for students in the past, so it is highly recommended that you bring a laptop with you to lab each week.

10% Discussion Section. The discussion score will be determined by the student's preparation, participation, and performance on quizzes. *There are no make ups for quizzes.*

20% Final paper. It will be the continuation of your scientific paper from biochemistry laboratory 1. In addition to that, this paper will need to include a quality figure of where the mutants are located. Due date will be announced.

If the final papers are submitted late, one-point deduction will be assessed for each day of tardiness.

Class grades:

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|--------------|--------------------|--------------|
| 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 Orlof or Jessica Eisenberg during regularly scheduled Office Hours,

Agnes: Mo 10:30 am -11:30 am. The office location, telephone number, and e-mail address are: Flanner Hall 428, (773) 508-2883 aorlof@luc.edu

Jessica: Mon and Tues 2:30-3:30 pm. 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: We will follow the standards of the College of Arts and Sciences. In case a violation is detected, the particular assignment may receive a grade of zero.