Laboratory in Cell Biology (BIOL301)
Spring 2025
Wednesdays 2-4.50pm
ISC 304

Instructor information

Dr. Varuni Jamburuthugoda
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Textbook

Dr. Jamburuthugoda will provide relevant protocols and background information to students via Brightspace.

Course Description

This course is built around research and the skills and approaches necessary for research. The topic of the research is an enzyme, Malate Dehydrogenase (MDH), that plays a central role in metabolism. During this course you will establish a purification protocol for watermelon glyoxasomal malate dehydrogenase. You will also learn how to perform kinetic assays of the enzyme and in the next several weeks will learn the basics of plasmid purification and the design of site directed mutants using the QuikChange protocol. This semester you will utilize some of these basic techniques in addition to more advanced techniques to put together a research project involving an investigation of structure-function relationships of glyoxasomal malate dehydrogenase. The project will culminate in both a research presentation and a research paper that form the final exam in the course.

Course Objectives

Upon completion of this course, the student should be able to:

- Record information in a laboratory notebook.
- Comply with laboratory safety.
- Perform basic lab techniques including, protein expression, protein purification, SDS-PAGE gel analysis, DNA isolation and analysis, transformation, Enzymatic activity assays, UV/Vis spectrophotometry and protein structure viewing.
- Use problem-solving techniques and be creative in solving laboratory problems
- Compose formal laboratory reports involving critiquing and discussing laboratory outcomes.

Lab Notebook

Students will need a bound composition notebook with page numbers that can be a dedicated lab notebook for this class. This notebook, along with a pen, should be brought to all lab sessions. Students should outline the procedure that they will follow in the laboratory notebook before each lab period, with space to make adjustments. Lab notebooks will be checked regularly throughout the semester. Your laboratory notebook should be an accurate record of what you do in the lab and should contain notes and calculations as well as appropriate comments about the experiment that you are working on.

Pre-lab Quizzes and Assignments

Prior to each laboratory session, you are required to complete the pre-lab assignments for each lab and outline the procedures you will be carrying out that day. Preparation and understanding of the lab will also be evaluated via quizzes.

Course Evaluation

Lab quizzes and assignments	40%
Lab notebooks	20%
Research Proposal and Final Paper	30%
Final presentation	10%

Grading Scale

- The following scale will be used to calculate final grades.

A = 100-93%	A^- =92.9-90%	B^+= 89.9-87%	B = 86.9-83%
B -= 82.9-80%	C^+ = 79.9-77%	C = 76.9-73%	C- = 72.9-70%
D = 69.9-60%	F = 59-0%		

Accessibility

- SUNY Geneseo is dedicated to providing an equitable and inclusive educational experience for all students. The Office of Accessibility will coordinate reasonable accommodations for persons with documented physical, emotional, or cognitive disabilities, as well as medical conditions related to pregnancy or parenting.
- Students with letters of accommodation should submit a letter to each faculty member at the beginning of the semester and discuss specific arrangements. Please contact the Office of Accessibility Services for questions related to access and accommodations.
  Office of Accessibility Services, Erwin Hall 22
  (585) 245-5112

Safeguarding your mental health

- Diminished mental health, including significant stress, mood changes, excessive worry, or problems with eating and/or sleeping can interfere with optimal academic performance. The source of symptoms might be strictly related to your course work; if so, please speak with me. However, problems with relationships, family worries, loss, or a personal struggle or crisis can also contribute to decreased academic performance.
- SUNY Geneseo provides mental health services to support the academic success of students. Counseling Services, a part of the Lauderdale Center for Student Health & Counseling, offers free, confidential psychological services to help you manage personal challenges that may threaten your well-being.
- In the event I suspect you need additional support, I will express my concerns and the reasons for them, and remind you of resources (e.g., Counseling Services, Career Services, Dean of Students, etc.) that might be helpful to you. It is not my intention to know the details of what might be bothering you, but simply to let you know I am concerned and that help, if needed, is available. Getting help is a smart and courageous thing to do for yourself /and /for those who care about you.

Academic Honesty and Plagiarism

- Academic dishonesty includes cheating, knowingly providing false information, plagiarizing, and any other form of academic misrepresentation. Academic dishonesty will not be tolerated in this course.
- Students are expected to adhere to the University's policy on academic dishonesty and plagiarism, located in the handbook. Academic dishonesty and plagiarism have serious consequences, and if you're struggling, please ask for help rather than resort to dishonesty! Academic dishonesty will result in a zero on the assignment or exam. In addition, a report will be filed to the department chair and Dean of the College, and a record of academic dishonesty will be placed in the student's file at the Dean of Students Office.

Week	Date	Activity
1	1/22	Introduction to lab Review lab safety and syllabus Review lab notebook guidelines Prepare LB media and LB/Agar plates Practice proper pipetting techniques
2	1/29	Quiz 1 Introduction to Malate Dehydrogenase (MDH) and MDH CURE Community (MCC) Virtual visit from Dr. Ellis Bell, University of San Diego Conduct transformation of MDH wild type plasmid DNA into BL21 cells
	1/30	Take picture of your plate – wrap and place in fridge
3	2/5	Quiz 2 Prepare buffers for protein purification and kinetic assays Discuss research article and hypothesis development Bioinformatics
4	2/11	MDH (wild type) protein expression Day 1: Inoculate starter 5ml overnight culture
	2/12	Quiz 3 Day 2: Induce expression of MDH Analyze mock kinetic data
	2/13	Day 3: Pellet cells and freeze
5	2/18	MDH (wild type) protein purification Day 1: Lyse cells and bind to Nickel resin for protein purification
	2/19	Quiz 4 Day 2: Elute MDH (wild type) protein from Nickel column SDS-PAGE

6	2/26	Quiz 5 Bradford Assay Wild type MDH initial rate kinetic assay
7	3/5	Quiz 6 Wild Type MDH activity assay continues Primer Design for site-directed mutagenesis
8	3/12	Quiz 7 Enzyme Kinetics with MDH to calculate K_{cat} and K_m Research Proposal-Draft 1 due
9	**3/19**	**Spring Break**
10	3/26	Research project
11	4/2	Research project
12	4/9	Research project Virtual visit from Dr. Ellis Bell, University of San Diego
13	4/16	Research project
14	**4/23**	**GREAT DAY**
15	4/30	Research project
16	5/7	Research Project Presentations Final written report due