

San José State University
College of Science, Chemistry Department
CHEM 234, Enzymology, Fall 2022

Course and Contact Information

Office Location: DH 607

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Office Hours: Tuesdays and Thursdays 11:00 am – 12:00 pm or by email appointment

Class Days/Time: Mondays and Wednesdays, 3:30 pm – 4:45 pm

Classroom: Sweeney Hall, 348

Prerequisites: CHEM 130B or CHEM 135 (or equivalent with a grade of "C" or better; "C-" not accepted).

Course Description

This course is a master's level biochemistry survey of enzyme structure, function, classification, isolation and methodology, mechanisms, theory of catalysis, enzyme kinetics, pH effects, allosterism and regulation.

Course Format

In-person and hybrid if necessary. Subjective to any change in University policies.

Course Materials on Canvas

Course materials such as syllabus, handouts, notes, assignment instructions, etc. can be found on [Canvas Learning Management System course login website](#). You are responsible for regularly checking with the messaging system through [MySJSU](#) on [Spartan App Portal](#) to learn of any updates. For help with using Canvas see [Canvas Student Resources](#) page.

Course Learning Outcomes (CLO)

Upon successful completion of this course, students will be able to:

1. Apply different methods for studying enzymology and interpret the data from these methods
2. Understand and critically analyze the experimental results in a peer-reviewed journal article on the topic of enzymology.
3. Propose experimental approaches to answer a question or test a hypothesis in the field of enzymology.
4. Appreciate the fact that there remain many more unknowns in enzymology than known facts.

Required Texts/Readings

Textbook

None. Students should be able to follow the class through assigned readings and in-class lectures.

Other Readings

Suggested reading:

Robert A. Copeland, *Enzymes*

Perry A. Frey, Adrian D. Hegeman, *Enzymatic Reaction Mechanisms*

Alan Fersht, *Structure and Mechanism in Protein Science*

Other technology requirements / equipment / material

Access to the internet and Microsoft Office programs.

Library Liaison

Anne Marie Engelsen

annemarie.engelsen@sjsu.edu

4055 King Library

(408) 808-2007

Course Requirements and Assignments

- Peer-reviewed articles will be assigned throughout the course, reading these articles before class is essential for following the material during lecture. Short quizzes will be administered on Canvas before class to assess the reading.
- Graded homework will be assigned in Module 1. Group work is encouraged, but individual students should be able to explain their work verbally to the instructor.
- Technique talks, journal talks and a final proposal pitch are part of the oral presentation portion of the class, these presentations will be graded both by the instructor and peers. Details for the presentations will be posted on Canvas.
- Students will craft a 3-page NIH style proposal on a chosen question related to enzymology as the final assignment for the class. Various drafts and workshop sessions are involved in preparing this proposal as well.

Per [*University Policy S16-9*](#):

“Success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of 45 hours over the length of the course (normally three hours per unit per week) for instruction, preparation/studying, or course related activities, including but not limited to internships, labs, and clinical practica. Other course structures will have equivalent workload expectations as described in the syllabus.”

Final Evaluation

The NIH style proposal will be due as well as an in-person proposal pitch will take place on December 12th, 2022, as the culminating event of the semester. The proposal and the pitch should be original work done by the student.

Grading Information

- The breakdown of grades is shown in the following table. Detailed grade breakdowns and grading rubrics will be posted on Canvas.

| | |
|--------------------------|------------|
| Pre-class Quizzes | 30 |
| Homework (3) | 90 |
| Technique Presentation | 20 |
| Journal Presentation | 40 |
| Research Proposal Drafts | 50 |
| Proposal Pitch | 20 |
| Research Proposal | 100 |
| Total Points | 350 |

- Late Work: Unless excused for good reason, 5% of the total grade for each assignment will be deducted for every 24 hours of late submission.
- The final course grade will be determined by rounding your final score to two significant figures and assigning grades as follows:

| <i>Grade</i> | <i>Percentage</i> |
|----------------|-------------------|
| <i>A plus</i> | <i>97 to 100%</i> |
| <i>A</i> | <i>94 to 96%</i> |
| <i>A minus</i> | <i>90 to 93%</i> |
| <i>B plus</i> | <i>87 to 89 %</i> |
| <i>B</i> | <i>84 to 86%</i> |
| <i>B minus</i> | <i>80 to 83%</i> |
| <i>C plus</i> | <i>77 to 79%</i> |
| <i>C</i> | <i>74 to 76%</i> |
| <i>C minus</i> | <i>70 to 73%</i> |
| <i>D plus</i> | <i>67 to 69%</i> |
| <i>D</i> | <i>64 to 66%</i> |
| <i>D minus</i> | <i>60 to 63%</i> |
| <i>F</i> | <i>Below 60%</i> |

Classroom Protocol

At SJSU, we hope that the classroom will serve as an environment that will promote learning and the development of new ideas, as well as be a safe and respectful community. Behavior that interferes with the normal academic function in a classroom is unacceptable. Students exhibiting this behavior will be asked to leave the class. Examples of such behavior include

- Persistent interruptions or using disrespectful adjectives in response to the comments of others.
- The use of obscene or profane language.
- Yelling at classmates and/or faculty.
- Persistent and disruptive late arrival to or early departure from class without permission.
- Physical threats, harassing behavior, or personal insults (even when stated in a joking manner).

University Policies

Per [University Policy S16-9](#), relevant university policy concerning all courses, such as student responsibilities, academic integrity, accommodations, dropping and adding, consent for recording of class, etc. and available student services (e.g. learning assistance, counseling, and other resources) are listed on [Syllabus Information](#) webpage (<https://www.sjsu.edu/curriculum/courses/syllabus-info.php>). Make sure to visit this page to review and be aware of these university policies and resources.

CHEM 234 / Enzymology, Fall 2022, Course Schedule

This schedule is tentative and subject to change with fair notice, which will be made available through Canvas.

Course Schedule

| Module | Date | Topics, Readings, Assignments, Deadlines | Assignments |
|--|------------|---|-----------------|
| Module 1: Principles and Techniques | 08/22/2022 | Class overview, history of enzymology, web tools | |
| | 08/24/2022 | Protein structure: the basics | |
| | 08/29/2022 | Protein structure: motifs/folds and determination | |
| | 08/31/2022 | Protein folding and stability | Homework 1 |
| | 09/05/2022 | <i>Labor Day, no class</i> | |
| | 09/07/2022 | Enzyme catalysis: mechanism and substrate specificity | |
| | 09/12/2022 | Chemical kinetics | |
| | 09/14/2022 | Enzyme kinetics | |
| | 09/19/2022 | Transient state kinetics | Homework 2 |
| | 09/21/2022 | Isotope effects, pH rate profiles | |
| | 09/26/2022 | <i>Technique Flash Talks</i> | |
| | 09/28/2022 | Cofactors | |
| | 10/03/2022 | Allosteric regulation | |
| | 10/05/2022 | Enzyme inhibition | Homework 3 |
| Module 2: Case Studies of the "Greatest Hits" | 10/10/2022 | PLP and Flavin Introduction | |
| | 10/12/2022 | <i>PLP and Flavin Journal Club</i> | |
| | 10/17/2022 | Metalloenzymes Introduction | |
| | 10/19/2022 | <i>Metalloenzymes Journal Club</i> | |
| | 10/24/2022 | Post-translational Modification Enzymes Introduction | |
| | 10/26/2022 | <i>Post-translational Modification Enzymes Journal Club</i> | |
| | 10/31/2022 | Natural Product Synthesis Introduction | |
| | 11/02/2022 | <i>Natural Product Synthesis Journal Club</i> | |
| | 11/07/2022 | Ribozymes Introduction | |
| | 11/09/2022 | <i>Ribozyme Journal Club</i> | |
| Module 3: The Future of Enzymology | 11/14/2022 | Wither Enzymology, Predictive Enzymology | |
| | 11/16/2022 | Proposal Workshop: Literature Search | Topic Due |
| | 11/21/2022 | Designing Enzymes | |
| | 11/23/2022 | <i>Thanksgiving Day, no class</i> | |
| | 11/28/2022 | Proposal Workshop: Brainstorming | References Due |
| | 11/30/2022 | Finding New Enzymes | |
| | 12/05/2022 | Proposal Workshop: Grantsmanship | Draft Due 12/07 |
| | 12/12/2022 | Proposal Pitch 2:45 pm | Proposal Due |