

**San José State University**  
**Chemistry Department**  
**CHEM 130C, Biochemistry, 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: Tuesdays and Thursdays 9:00 am – 10: 15 am

Classroom: Dudley Moorhead Hall 227

Prerequisites: CHEM 112B (with grades of "C" or better; "C-" not accepted). CHEM 130A (with grades of "C" or better; "C-" not accepted).  
BIOL 30 (with grades of "C" or better; "C-" not accepted).

**Course Description**

Advanced biochemical topics selected from the fields of immunology, physiology, molecular and cell biology. This is the third of a three-semester course sequence in biochemistry intended to provide a thorough introduction to this discipline. This semester's material will focus on molecular biology. Major topics include nucleic acid structure/function relationships, DNA replication, repair and recombination, transcription and RNA processing, translation of transcribed RNA, regulation of prokaryotic and eukaryotic gene expression, related biotechniques and virology.

**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.

**Learning Outcomes**

CHEM 130C covers the following Program Learning Objectives (PLOs):

- PLO 1.1 - Students will be able to identify, formulate, and solve a range of chemistry problems (fundamental to complex) through application of mathematical, scientific, and chemical principles.
- PLO 1.2 - Students will be able to recognize, relate, and/or apply chemistry terms and concepts to propose and solve interdisciplinary and multidisciplinary real world problems.
- PLO 3.1 - Students will be able to explore, critique, and reflect on how chemistry relates to society, culture, and issues of equity and ethics that shape their scientific beliefs and identities.
- PLO 3.2 - Students will be able to identify as scientists within the scientific community through constructing peer reviews, engaging in collaborations, and participating in mentorship.

- PLO 4.2 - Students will be able to integrate research findings into a concise original written report that either analyzes collected data and obtained results or reviews and reflects on published scientific work.

The following are the Course Learning Outcomes (CLO) for CHEM 130C:

Students will learn about the biochemical aspects of molecular biology, including replication, transcription, translation, genetic regulation, bio techniques and virology.

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

Demonstrate understanding of core concepts, methods, and limits of scientific investigation to effectively solve problems in biochemistry.

## Required Texts/Readings

### Textbook

Nelson and Cox, *Lehninger Principles of Biochemistry*. Any edition is ok. The book is available in a variety of formats including hardcover (ISBN: 9781429234146) and loose-leaf sheets (ISBN: 9781429293129). The hardcover format is available at the Spartan Bookstore.

### Other Readings

Papers from the scientific literature and educational videos will be noted on Canvas for either additional information on certain topics or for assigned review and summary of the material.

### Other technology requirements / equipment / material

- Clicker questions will be included during class and your responses will contribute to participation points. Students will be able to answer the questions using laptops, mobile phones or tablets. For more information on creating iClicker accounts, see <http://www.sjsu.edu/ecampus/teaching-tools/reef/index.html>. Details for joining the course will be posted on Canvas.
- Course-based discussion will be hosted on Discord (<https://discord.com/>) and participation will be counted towards the final grade. Students are required to obtain a Discord account and join the 130C course space. Details will be posted on Canvas.

## Course Requirements and Assignments

Graded work will include the following: participation assignments, three journal article projects, two mid-term exams, five take-home worksheets, and one final exam. The journal article projects will be based on a piece of primary literature related to class. Their due dates will be noted in class and on the Canvas website. Exams will be taken in class.

Note that the [University Policy S16-9](#), states that:

“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 Examination or Evaluation

There will be two written midterm exams and one written final exam. The final exam will be cumulative and cover all of the concepts that we discuss during the duration of the semester. The content of the final exam will emphasize the interconnectedness between the many topics that we cover. More details can be found in [University policy S17-1](#) which states that

“Faculty members are required to have a culminating activity for their courses, which can include a final examination, a final research paper or project, a final creative work or performance, a final portfolio of work, or other appropriate assignment.”

## Grading Information

Each exam and worksheet will have points evenly distributed throughout. Practice exams and quizzes will be posted on Canvas for students to assess themselves and check their learning. Throughout the semester, the problems in the back of the textbook chapters will provide a valuable resource for students to check their comprehension of the textbook material.

Rubrics for the three projects based on journal articles will be discussed in class. Briefly, students will read an assigned article and critically analyze or summarize the goals, methods, results, and/or conclusions from the article as explained in class and on Canvas. These assignments will require students not only to read the assigned article but also to read further information from referenced articles and/or their textbook.

More guidelines on grading information and class attendance can be found from the following university policies:

- [University Syllabus Policy S16-9](#)
- [University Attendance and Participation Policy F15-12](#)
- [University Grading System Policy F18-5](#)

## Determination of Grades

### Course Grade:

The final grade in the course will be based on the following eight scores: 2 Midterm Exams (100 points each), Final Exam (100 points), 6 Worksheets (20 points each), 3 Journal Article Projects (60 points total), i-Clicker (40 pts), Pre-class questions (25 pts), Discord Participation (15 pts) and Gene Regulation Share Out (10 pts).

- Six worksheets are assigned in the course of the semester, and the lowest worksheet score will be dropped for a total of five quizzes.
- For the i-Clicker points: full points will be given if you answer more than 80% of the questions, regardless of correctness.
- The raw score for each exam will be the final score for that exam; however, the instructor reserves the right to scale the scores if she deems it to be appropriate.

Projects (3)	60
i-Clicker	40
Pre-class Questions	25
Discord Participation	15
Share Out	10
Worksheets (5)	100
Midterms (2)	200
Final Exam	100
<hr/> Total Points	<hr/> 550

- Late Work: Unless excused for good reason, 5% of the total grade for each assignment will be deducted for every 24 hrs of late submission.

Extra Credit Opportunity:

Students have an option for up to 10 extra credit points (added to the Total Score). Details of this assignment will be described in class. Briefly, students may choose one of the following options: A) Working individually or as a group, present projects that incorporate biochemistry and molecular biology concepts with other topics outside of the scope of biochemistry and molecular biology including, but not limited to, technology, literature, music, art, history, etc. If students work in groups, each student must participate equally to receive full credit. B) Explain a concept covered in the course using the 1,000 most common words in the English language.

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

- a) Persistent interruptions or using disrespectful adjectives in response to the comments of others.
- b) The use of obscene or profane language.
- c) Yelling at classmates and/or faculty.
- d) Persistent and disruptive late arrival to or early departure from class without permission.
- e) 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 130C Biochemistry (Molecular Biology), Course Schedule

The schedule is subject to change with fair notice. Any change to the schedule will be posted and announced on Canvas.

## Course Schedule

Class	Date	Topics	Deadlines
1	08/23/2022	Part III Intro (p. 977-8) - Intro to Molecular Biology	
2	08/25/2022	Chapter 8.1,8.2 - Nucleic Acids: Basics and Structure	
3	08/30/2022	Chapter 8.2, 8.3 - Nucleic Acids: Structure and Chemistry	
4	09/01/2022	Chapter 8.3 - Nucleic Acids: Technology	
5	09/06/2022	Chapter 24.1,24.2 -Chromosomes: Supercoiling and Topoisomerase	<i>Worksheet 1</i>
6	09/08/2022	Chapter 24.3 - Chromosome Structure	
7	09/13/2022	Chapter 25.1 – DNA: Replication	
8	09/15/2022	Chapter 25.2 - DNA: Repair;	<i>Project 1</i>
9	09/20/2022	Chapter 25.3 - DNA: Recombination	
10	09/22/2022	Chapter 26.1 - RNA: Transcription	<i>Worksheet 2</i>
11	09/27/2022	Chapter 26.1 - RNA: Transcription	
	09/29/2022	<b>Exam I</b>	
12	10/04/2022	Chapter 26.2 - RNA: Processing	
13	10/06/2022	Chapter 26.3 - RNA: RNA-Dependent Synthesis of RNA and DNA	
14	10/11/2022	Chapter 27.1 - Protein: The Genetic Code	<i>Worksheet 3</i>
15	10/13/2022	Chapter 27.2 - Protein: Synthesis;	
16	10/18/2022	Chapter 27.2 - Protein: Synthesis	<i>Project 2</i>
17	10/20/2022	Chapter 27.3 - Protein: Posttranslational Modification and Targeting	
18	10/25/2022	Chapter 27.3 - Protein: Degradation	
19	10/27/2022	Chapter 28.1 - Principles of Gene Regulation	<i>Worksheet 4</i>
20	11/01/2022	Chapter 28.2 – Gene Expression: Bacteria	
21	11/03/2022	Chapter 28.3 - Gene Expression: Bacteria	
22	11/08/2022	Molecular Biology Techniques: CRISPR-Cas9	<i>Worksheet 5</i>
	11/10/2022	<b>Exam II</b>	
23	11/15/2022	Chapter 28.3 - Gene Expression: Eukaryotes	
24	11/17/2022	Chapter 28.3 - Gene Expression: Eukaryotes	<i>Project 3</i>
25	11/22/2022	Gene Regulation Share Out	
	11/24/2022	<i>Thanksgiving Holiday – no class</i>	
26	11/29/2022	<i>Voet</i> Chapter 33.3 – Bacteriophage $\lambda$	
27	12/01/2022	<i>Voet</i> Chapter 33.3 – Bacteriophage $\lambda$	
28	12/06/2022	Review	<i>Worksheet 6</i>
	12/14/2022	<b>Comprehensive Final Exam (7:15-9:30 am)</b>	