

**San José State University**  
**Chemistry Department**  
**CHEM 130C, Biochemistry (Molecular Biology), Fall 2019**

**Course and Contact Information**

<b>Instructor:</b>	Dr. Ningkun Wang
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<b>Office Hours:</b>	Mon and Wed 1:30 PM– 2:30 PM, and by appointment
<b>Class Days/Time:</b>	Mon and Wed at 9:00-10:15 AM
<b>Classroom:</b>	Duncan Hall 250
<b>Prerequisites:</b>	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).

**Canvas Web Page**

Course materials such as syllabus, handouts, notes, assignment instructions, etc. can be found on [Canvas Learning Management System course login website](http://sjsu.instructure.com) at <http://sjsu.instructure.com>.

**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 Learning Outcomes (CLO)**

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/Videos

Alberts et al., *Molecular Biology of the Cell*, 4th edition (optional). This is a good resource for background on molecular biology concepts. It can be accessed for free on [Pubmed](http://www.ncbi.nlm.nih.gov/books/NBK21054/) at <http://www.ncbi.nlm.nih.gov/books/NBK21054/>

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 remote clicker devices. 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 Requirements and Assignments

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. More details about student workload can be found in [University Policy S16-9](http://www.sjsu.edu/senate/docs/S16-9.pdf) at <http://www.sjsu.edu/senate/docs/S16-9.pdf>.

### Requirements:

Graded work will include the following: three journal article projects, three mid-term exams, five quizzes, 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 and quizzes will be taken in class and will be administered at the beginning of class. Homework problems will be assigned, but any problems done outside of class will not be graded. Working these homework problems is a particularly helpful way to be prepared for exams and quizzes.

NOTE that [University policy F69-24](http://www.sjsu.edu/senate/docs/F69-24.pdf) at <http://www.sjsu.edu/senate/docs/F69-24.pdf> states that “Students should attend all meetings of their classes, not only because they are responsible for material discussed therein, but because active participation is frequently essential to insure maximum benefit for all members of the class. Attendance per se shall not be used as a criterion for grading.”

## Final Examination or Evaluation

There will be 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. It is expected that all students will take the final; make-up exams will not be given. The final exam must be taken at the scheduled time in order to pass the course. More details can be found in [University policy S17-1](http://www.sjsu.edu/senate/docs/S17-1.pdf) (<http://www.sjsu.edu/senate/docs/S17-1.pdf>).

## Grading Information

Each exam and quiz will have points evenly distributed throughout. The more challenging questions will be awarded more points than the simpler questions. 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.

## Determination of Grades

### Course Grade:

The final grade in the course will be based on the following six scores: Three Midterm Exams (100 points each), Final Exam (100 points), Five Quizzes (20 points each), and Three journal article projects (60 points total), Participation (40 pts) and Pre-class Questions (50 pts). *Six quizzes are given in the course of the semester, and the lowest quiz score will be dropped for a total of five quizzes. Participation points will be based on in-class clicker questions: full points will be given if you answer more than 80% of the questions, regardless of correctness. Pre-class questions will be assigned on Canvas, graded on correctness and due 15 minutes before each class.* 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. Each quiz will be short (1-3 questions) and will not be scaled.

Projects (3)	60
Participation	40
Pre-class Questions	25
Quizzes (5)	100
Midterms (3)	300
Final Exam	100
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Total Points	625

### 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 three significant figures and assigning grades as follows:

<u>Score Average</u>	<u>Final Course Grade</u>
97.0-100	A+
93.0-96.9	A
90.0-92.9	A-
87.0-89.9	B+
83.0-86.9	B
80.0-82.9	B-
77.0-79.9	C+
73.0-76.9	C
70.0-72.9	C-
67.0-69.9	D+
63.0-66.9	D
60.0-62.9	D-
< 60.0	F

### **Missed Exams and Quizzes**

The quizzes and midterms will be taken in class. THERE ARE NO MAKE-UP EXAMS. Quizzes will be administered at the beginning of class. Any quiz that is missed without an acceptable and documented excuse will receive a score of 0. This includes a late arrival on the day of a scheduled quiz. If an acceptable excuse is provided for a missed quiz, the grade will be prorated. If an acceptable excuse is provided for a late arrival on the day of a scheduled quiz, the quiz will be given after class on that day. The final exam must be taken in order to pass the course.

### **Exam Regrades**

If you feel that an error was made in the grading of your exam you may submit the exam, together with a *written* description of the error, to me for regarding not later than one week after the graded exam is returned to the class. However, I will not entertain requests for more partial credit on a problem unless the posted partial credit scheme was not properly applied to your exam. Be aware that students who submit frivolous regrade requests may become ineligible to receive future letters of recommendation from me. Furthermore, if you wish for me to regrade any question on your exam, I reserve the right to regrade other questions on the exam as well.

Note that “All students have the right, within a reasonable time, to know their academic scores, to review their grade-dependent work, and to be provided with explanations for the determination of their course grades.” See [University Policy F13-1](http://www.sjsu.edu/senate/docs/F13-1.pdf) at <http://www.sjsu.edu/senate/docs/F13-1.pdf> for more details.

### **Classroom Protocol**

It is expected the students attend class and arrive on time. Since quizzes and exams are administered at the beginning of the class period, you are expected to be present at the time the quiz or exam begins. Please act in a safe and professional manner throughout the class. This includes treating yourself, your classmates, and your instructor with respect. Cell phone use is not allowed during the class unless needed for in-class activities. If

you must take a phone call or write a text message for emergency purposes, you may step outside of the room to do so. Smartwatches are allowed during lecture but are prohibited during quizzes and exams.

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).
- f) Use of personal electronic devices such as cell phones, laptops or tablets in class, unless it is part of the instructional activity.

### **University Policies**

Per University Policy S16-9, university-wide policy information relevant to all courses, such as academic integrity, accommodations, etc. will be available on Office of Graduate and Undergraduate Programs' [Syllabus Information web page](http://www.sjsu.edu/gup/syllabusinfo/) at <http://www.sjsu.edu/gup/syllabusinfo/>"

### **SJSU Peer Connections**

Peer Connections, a campus-wide resource for mentoring and tutoring, strives to inspire students to develop their potential as independent learners while they learn to successfully navigate through their university experience. You are encouraged to take advantage of their services which include course-content based tutoring, enhanced study and time management skills, more effective critical thinking strategies, decision making and problem-solving abilities, and campus resource referrals.

In addition to offering small group, individual, and drop-in tutoring for a number of undergraduate courses, consultation with mentors is available on a drop-in or by appointment basis. Workshops are offered on a wide variety of topics including preparing for the Writing Skills Test (WST), improving your learning and memory, alleviating procrastination, surviving your first semester at SJSU, and other related topics. A computer lab and study space are also available for student use in Room 600 of Student Services Center (SSC).

Peer Connections is located in three locations: SSC, Room 600 (10th Street Garage on the corner of 10<sup>th</sup> and San Fernando Street), at the 1st floor entrance of Clark Hall, and in the Living Learning Center (LLC) in Campus Village Housing Building B. Visit [Peer Connections website](http://peerconnections.sjsu.edu) at <http://peerconnections.sjsu.edu> for more information.

### **SJSU Counseling Services**

The SJSU Counseling Services is located on the corner of 7<sup>th</sup> Street and San Fernando Street, in Room 201, Administration Building. Professional psychologists, social workers, and counselors are available to provide consultations on issues of student mental health, campus climate or psychological and academic issues on an individual, couple, or group basis. To schedule an appointment or learn more information, visit [Counseling Services website](http://www.sjsu.edu/counseling) at <http://www.sjsu.edu/counseling>.

## CHEM 130C, Molecular Biology, Fall 2019, Course Schedule

*The schedule is subject to change. Changes will be noted in class.*

Class	Date	Readings and Topics
1	Aug. 21	Part III Intro (p. 977-8) - Intro to Molecular Biology
2	Aug. 26	Chapter 8.1,8.2 - Nucleic Acids: Basics and Structure
3	Aug. 28	<b>Quiz 1;</b> Chapter 8.2, 8.3 - Nucleic Acids: Structure and Chemistry
	Sept. 2	<i>Labor Day – no class</i>
4	Sept. 4	Chapter 8.3 - Nucleic Acids: Technology
5	Sept. 9	Chapter 24.1,24.2 - Chromosomes: Supercoiling and Topoisomerase
6	Sept. 11	<b>Quiz 2;</b> Chapter 24.3 - Chromosome Structure
7	Sept. 16	Chapter 25.1 – DNA: Replication
8	Sept. 18	Chapter 25.2 - DNA: Repair; <i>Project 1 due</i>
9	Sept. 23	Chapter 25.3 - DNA: Recombination
10	<b>Sept. 25</b>	<b>EXAM I</b>
11	Sep. 30	Chapter 26.1 - RNA: Transcription
12	Oct. 2	Chapter 26.1 - RNA: Transcription
13	Oct. 7	Chapter 26.2 - RNA: Processing
14	Oct. 9	<b>Quiz 3;</b> Chapter 26.3 - RNA: RNA-Dependent Synthesis of RNA and DNA
15	Oct. 14	Chapter 27.1 - Protein: The Genetic Code
16	Oct. 16	Chapter 27.2 - Protein: Synthesis; <i>Project 2 due</i>
17	Oct. 21	<b>Quiz 4;</b> Chapter 27.2 - Protein: Synthesis
18	Oct. 23	Chapter 27.3 - Protein: Posttranslational Modification and Targeting
19	Oct. 28	Chapter 27.3 - Protein: Degradation
20	<b>Oct. 30</b>	<b>EXAM II</b>
21	Nov. 4	Chapter 28.1 - Principles of Gene Regulation
22	Nov. 6	Chapter 28.2 – Gene Expression: Bacteria
	Nov. 11	<i>Veteran's Day Observed – no class</i>
23	Nov. 13	<b>Quiz 5;</b> Chapter 28.3 - Gene Expression: Bacteria
24	Nov. 18	Chapter 28.3 - Gene Expression: Eukaryotes; <i>Project 3 due</i>
25	Nov. 20	Chapter 28.3 - Gene Expression: Eukaryotes
26	<b>Nov. 25</b>	<b>EXAM III</b>
26	Nov. 27	<i>Thanksgiving Holiday – no class</i>
27	Dec. 2	Molecular Biology Techniques: CRISPR-Cas9
28	Dec. 4	<i>Voet</i> Chapter 33.3 – Bacteriophage $\lambda$
29	Dec. 9	<b>Quiz 6;</b> <i>Voet</i> Chapter 33.3 – Bacteriophage $\lambda$ and Review
Final Exam	<b>Dec. 13</b>	<b>Comprehensive Final Exam</b> (7:15-9:30 am in DH 250)