San José State University
Chemistry Department
CHEM 130A, Biochemistry, Spring 2023

Course and Contact Information

Office Location:	DH 607
Telephone:	408-924-4955
Email:	ningkun.wang@sjsu.edu
Office Hours:	Mondays and Wednesdays 2:00 pm – 3:00 pm or by email appointment
Class Days/Time:	Tuesdays and Thursdays 10:00 am – 11: 40 am
Classroom:	Duncan Hall 415
Prerequisites:	CHEM 112B (with grades of "C" or better; "C-" not accepted).

Course Description

CHEM 130A explores the chemistry of amino acids, carbohydrates, lipids and nucleotides. Protein structure and function, protein isolation, enzyme kinetics and enzyme mechanisms are also investigated.

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.

GE Learning Outcomes (GELO)

CHEM 130A leads to partial fulfillment of Area R: Earth, Environment, and Sustainability (Upper Division B). The Area R requirement will be fulfilled after completion of CHEM 131B. Area R courses apply the scientific method and quantitative reasoning to engage in ethical, civic-minded inquiry around sustaining the earth, its environments and its inhabitants. The GELOs will be will be cultivated throughout the course and assessed on in-class activities, literature assignments, quizzes and/or exams. Students are strongly encouraged to satisfy GE Areas R, S, and V with courses from departments other than the major department. Completion of, or coregistration in, a 100W course is strongly recommended.

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

1. apply scientific principles and the scientific method to answer questions about earth, the environment, and sustainability while recognizing the limits of both the method and principles;

2. apply mathematical or quantitative reasoning concepts to the analysis and generation of solutions to issues of earth, the environment, and sustainability;
3. communicate a scientific finding, assertion, or theory to a general audience with the integrity and rigor of the underlying science; and
4. explain ethical, social, and civic dimensions of scientific inquiry.

Course Learning Outcomes (CLO)

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

1. 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.
2. 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.
3. 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.
4. 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.
5. PLO 4.1 - Students will be able to design and deliver engaging presentations on diverse chemistry topics in a professional manner and with clear, concise organization that demonstrates mastery of the topic.

Upon successful completion of this course, students will be able to describe and solve problems related to:

1. CLO (1): the major classes of biomolecules
2. CLO (2): the chemicals and physical mechanisms of their action
3. CLO (3): the experimental basis by which these mechanisms are deduced

Required Texts/Readings

Textbook

Nelson and Cox, Lehninger Principles of Biochemistry, 8th Edition is recommended. The book is available in a variety of formats including softcover (ISBN: 9781319228002) and loose-leaf sheets (ISBN: 9781319322342). The hardcover format is available at the Spartan Bookstore. Earlier editions are also acceptable. The 8th edition will also be available on reserve at the library. Recommended homework problems will be given from the 6th-8th editions.

Other Readings

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 at http://www.ncbi.nlm.nih.gov/books/NBK21054/.

Library Liaison

Anne Marie Engelsen (annemarie.engelsen@sjsu.edu)

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 130A course space. Details will be posted on Canvas.

Course Requirements and Assignments

Graded work will include a total of three quizzes (lowest of four quizzes is dropped), four exams (including the final; lowest of four exams is dropped), a literature assignment, pre-class questions, in-class i-clicker points, and Discord participation, which all contribute to the course learning outcomes. Due dates for assignments are in the Course Schedule below and on Canvas. Additional homework problems from the text will be suggested, but not graded. It is assumed that students will do all suggested homework. Working the homework problems is an excellent way to prepare for exams and quizzes. Work in the course will be weighted as shown below:

Literature Assignment	60
i-Clicker	80
Pre-class Questions	25
Discord Participation	15
Quizzes (Sum of top 3 scores from Quizzes 1-4)	60
Exam 1-3 + Final (Sum of top 3 scores from Exams 1-3 + Final)	300
Total Points	**540**

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. Please also consult other SJSU syllabus policies at http://www.sjsu.edu/senate/docs/S16-9.pdf and resources at https://www.sjsu.edu/curriculum/courses/syllabus-info.php

Exams and Quizzes

Quizzes and exams will be given at an exact date and time in-person. Only non-programmable calculators will be allowed on quizzes and exams.

In-Class Activities

Participation in in-class activities will be assessed by your voting in the iClicker poll, etc. Note, you must be present in during the activity to get credit for in class activities. Points will be distributed as follows: 80 points will be award for completing 80% of iClicker questions, 75 points for 75%, 70 points for 70%, 65 points for 65%, 60 points for 60%, and 50 points for 50%. A score of 40 points will be awarded for less than 50% completion of iClicker questions. Your participation will be prorated for that day if a legitimate excuse is provided within 24 hours of the absence (or as soon as possible for more complicated circumstances). Should you have a technical difficulty with iClicker/REEF Polling, you must notify me by 6 pm of that class day.

Literature Assignment

Details for the literature assignment, including the rubric, will be announced in class and posted on Canvas. Plagiarism will not be tolerated.

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 Chem 130A concepts with other topics outside of the scope of

biochemistry 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.

Final Examination or Evaluation

The final exam is comprehensive. Because it is an equal weight as the other exams, it will also be an equal time length (from 9:45 am – 11:25 am).

Grading Information

Points will be distributed as described in Course Requirements and Assignments above. The final course grade will be determined by rounding your final score to two significant figures and assigning grades as follows:

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

Minimum Grading Practice

The minimum grade awarded on exams, quizzes, literature assignments, and in-class activities will be a score of 50%. This is a more equitable grading practice that helps students recover from missed assignments or particularly poor assignment performances. If you are interested in learning more about this practice, see Webb, *Phys. Rev. Educ. Res.* **2020**, *16,* 020114 and Paul, *Phys. Rev. Phys. Educ. Res.* **2022**, *18*, 020103.

Missed Exams and Quizzes

If an exam or quiz is missed without a legitimate excuse a scaled score of 50% will be entered for that exam. If an acceptable excuse is provided then the exam grade will be prorated. In no case will a make-up exam or quiz be given after the date of the exam or quiz. Contact me in advance if you will miss a quiz or exam date for a legitimate activity. Note, The lowest quiz from quizzes 1-4 and the lowest exam from exams 1-3 and the final exam will be dropped.

Exam Regrades

If you feel that an error was made in the grading of your quiz or exam you may submit the quiz or exam with a written description of the error to me for regrading not later than one week after the graded quiz or exam is returned to the class.

Late Work

Literature assignments submitted after the due date on Canvas are considered late and subject to 5% point reduction (and subsequent 5% point reductions for each further day late). No late assignments will be accepted after the end of the Final Exam time slot (Friday May 19th, 9:45 am – 11:25am).

Plagiarism

Plagiarism on literature assignments will not be tolerated and will result in a score of 0 points for the assignment.

Program Planning

Anonymized student work may be used to assess the effectiveness of the course with respect to the GELOs and PLOs. Students can send me an email to request to exclude their work from the process.

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. It is expected the students attend class and arrive on time. Please act in a professional manner throughout the class. This includes treating yourself, your classmates, and your instructor with respect.
Behavior that interferes with the normal academic function in a classroom is unacceptable. Students exhibiting this behavior will be asked to leave the class.

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.

Academic Integrity

Your commitment, as a student, to learning is evidenced by your enrollment at San Jose State University. The University Academic Integrity Policy S07-2 (http://www.sjsu.edu/senate/docs/S07-2.pdf) requires you to be honest in all your academic course work. Faculty members are required to report all infractions to the office of Student Conduct and Ethical Development. Find more information at the Student Conduct and Ethical Development website at http://www.sjsu.edu/studentconduct/.

SJSU Counseling and Psychological Services

Professional psychologists, social workers, and counselors are available to provide confidential consultations on issues of student mental health, campus climate or psychological and academic issues on an individual, couple, or group basis through SJSU Counseling and Psychological Services (CAPS). To schedule an appointment or learn more information, visit the Counseling and Psychological Services website at http://www.sjsu.edu/counseling.

CHEM 130A Biochemistry I, Course Schedule

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

Course Schedule

Class	Date	Topics	Quizzes/Due Dates
1	01/26/2023	Chapter 1.1, 1.5 – Biological foundations	
2	01/31/2023	Chapter 1.2-1.3 – Chemical and physical foundations	
3	02/02/2023	Chapter 2.1-2.2 – Noncovalent interactions and acid/base chemistry	
4	02/07/2023	Chapter 2.3 – Buffers	**Quiz 1**
5	02/09/2023	Chapter 3.1-3.2 – Amino acids and peptides	
6	02/14/2023	Chapter 3.4 – Proteins: primary structure	
7	02/16/2023	**Exam 1**	
8	02/21/2023	Chapter 4.1-4.2 – Proteins: secondary structure	
9	02/23/2023	Chapter 4.3 – Proteins: tertiary structure	
10	02/28/2023	Chapter 3.3 - Proteins: purification	
11	03/02/2023	Chapter 4.4 – Protein denaturation	**Quiz 2**
12	03/07/2023	Chapter 4.4 – Protein folding	
13	03/09/2023	Chapter 4.4, 5.1 – Protein folding and binding	**Literature worksheet 1 due**
14	03/14/2023	Chapter 5.1 – Protein binding	
15	03/16/2023	Chapter 5.1 – Protein binding	
16	03/21/2023	**Exam 2**	
17	03/23/2023	Chapter 6.1-6.3 – Enzymes: Intro, function and kinetics	
	03/28/2023	*Spring Break – no class*	
	03/30/2023	*Spring Break – no class*	
18	04/04/2023	Chapter 6.3 - Enzyme kinetics and inhibition	
19	04/06/2023	Chapter 6.3 - Enzyme inhibition and bisubstrate reactions	**Quiz 3**
20	04/11/2023	Chapter 6.4 – Chymotrypsin	**Literature worksheet 2 due**
21	04/13/2023	Chapter 6.4 – Other enzyme mechanism principles	
22	04/18/2023	Chapter 7.1 – Mono- and disaccharides	
23	04/20/2023	Chapter 7.2-7.4 – Polysaccharides and glyconjugates	
24	04/25/2023	**Exam 3**	
25	04/27/2023	Chapter 10.1-10.2 – Storage and structural lipids	
26	05/02/2023	Chapter 10.2, 11.1-11.2 – Structural lipids and membrane structure and dynamics	**Literature presentation due**
27	05/04/2023	Chapter 11.1-11.2 – Membrane structure and dynamics	
28	05/09/2023	Chapter 11.3, 12.1– Membrane transport and signaling	**Quiz 4**
29	05/11/2023	Chapter 12.10, 12.11– Cell cycle regulation and cancer	
	05/19/2023	**Comprehensive Final Exam** (9:45 am – 11:25am)	