

# Biochemistry Section 01

## CHEM 130B

Spring 2023 4 Unit(s) 01/25/2023 to 05/15/2023 Modified 01/17/2023

**Class Days/Time:** Monday and Wednesday 8:30 to 10:10 am

**Classroom:** Duncan Hall 250.

*Class Canvas page* <https://sjsu.instructure.com/courses/1559065>

## Contact Information

**Instructor:** Dr. Sonia M. Cuellar-Ortiz (Dr. Cuellar) She/Her

**Office Location:** Duncan Hall 605

**Telephone:** 408 924 3808 (no voicemail)

**Email:** [sonia.cuellar-ortiz@sjsu.edu](mailto:sonia.cuellar-ortiz@sjsu.edu)

*Preferred contact method is emailing me through Canvas, I will respond within 24 business hours. Please do not expect an answer at night, on weekends or holidays.*

Canvas Announcements will be used to communicate with the class. Please be sure you get those timely

In case of any campus contingency information to continue the class will be published in Canvas Announcements

### Office hours:

Office Hours: Mondays 3 to 4 pm, Tuesdays and Thursdays 2 to 2:45pm.

*Office hours can be attended by showing up in my office (DH 605), by phone 408 924 2808 or online in zoom. Students must let me know they plan to attend online so I open the zoom session*

## Course Description and Requisites

Continuation of CHEM 130A, Concepts of bioenergetics; biochemical pathways of degradation and synthesis; metabolic regulation.

CHEM 130B is part of the three-course lecture sequence in biochemistry. Major topics focus on various aspects of metabolism, including energetics, regulation, and the anabolic and catabolic pathways of carbohydrates, lipids, amino acids and nucleotides. Control of flux of metabolites through the various pathways will be discussed in the context of efficient cellular physiology.

### Course Format

This is an in-person class. If a contingency arises that stops us from attending campus, some class sessions may be moved to online.

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

Letter Graded

## \* Classroom Protocols

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 lab 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 pagers, cell phones, PDAs in class, unless it is part of the instructional activity

## Course Goals

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CHEM 130B 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 4.2 - 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.

## Course Learning Outcomes (CLOs)

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

1. CLO (1): bioenergetics
2. CLO (2): metabolic pathways associated with carbohydrates, lipids, and amino acids
3. CLO (3): metabolic regulation and mechanisms of regulation
4. CLO (4): the experimental basis by which these mechanisms are deduced

## Course Materials

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### Lehninger Principles of Biochemistry

**Author:** David L. Nelson; Michael M. Cox

**Publisher:** Macmillan Learning

**Edition:** 7th Edition is recommended but other editions also work

**ISBN:** ISBN: 978-1-4641-2611-6 or ISBN: 978-1-4641-8796-4

**Availability:** The hardcover format is available at the Spartan Bookstore

Recommended homework problems will be given from the 7<sup>th</sup> and 6<sup>th</sup> editions

The book is available in a variety of formats including softcover or hardcover (ISBN: 978-1-4641-2611-6) and loose-leaf sheets (ISBN: 978-1-4641-8796-4).

## Molecular Biology of the Cell

**Author:** Alberts et al.

**Publisher:** W. W. Norton & Co.

**Edition:** 4th edition

**Optional**

**Availability:** It can be accessed for free on Pubmed at <http://www.ncbi.nlm.nih.gov/books/NBK21054/>.

This is a good resource for background on molecular biology concepts.

## Use of primary bibliography

Some assignments require the use of primary bibliography, if a scientific paper that students wish to use is not available the Library Liaison (Marie Engelsen [annemarie.engelsen@sjsu.edu](mailto:annemarie.engelsen@sjsu.edu)) may be able to help.

## ☰ Course Requirements and Assignments

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### Technology requirements

Students need reliable access to a computer and to internet to consult course materials, assignment and other resources

### Assignments

Graded work will include a total of three quizzes (lowest of four quizzes is dropped), three exams (lowest of four exams is dropped), three literature assignments, Pitch Day activities (including paper selection, presentation, and peer reviews), homework assignments and participation in class activities, which all contribute to the course learning outcomes.

The Final exam is considered one of the four class' exams and has the same value that each one of the midterm exams. However, midterm exams are not cumulative and the Final Exam is comprehensive and covers the whole semester

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:

## ✓ Grading Information

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	(points each)	Points	Percentage
Introduction assignments		10	2.5
Homework 24 (4 dropped)	1.00	20	5.0
Pitch Day activities		30	7.5
In class work 24 (4 dropped)	3.00	60	15.0

Quizzes 4 (1 dropped)	20.00	60	15.0
Lit assignments 3	20.00	60	15.0
Exams 4 (1 dropped)	53.33	160	40.0
Participation		20	5.0
Total		400	105.0

### Grading Information

Points will be distributed as described above. I reserve the right to scale quiz and exam grades. If scaled, each quiz or exam will be given a raw score and a scaled score. The raw score will simply be the number of points earned for correct answers on a particular exam or quiz, while the scaled score will be used to calculate your final grade. Scores will never be scaled down from your raw score. Generally, the average score on an exam will be scaled to a C minus, however, I reserve the right to adjust this in either direction if, in my estimation, the class overall performed differently than a “typical” class. Note, a D minus is a passing grade for the course. The course grade will be determined from the resulting final point total as follows:

## Determination of Grades

The final course grade will be determined by rounding your final score to three significant figures and assigning grades as follows:

<i>Grade</i>	<i>Percentage</i>	<i>Grade</i>	<i>Percentage</i>	<i>Grade</i>	<i>Percentage</i>	<i>Grade</i>	<i>Percentage</i>
<i>A plus</i>	<i>97.0 to 100%</i>	<i>B plus</i>	<i>87.0 to 89.9 %</i>	<i>C plus</i>	<i>77.0 to 79.9%</i>	<i>D plus</i>	<i>67.0 to 69.0%</i>
<i>A</i>	<i>93.0 to 96.9%</i>	<i>B</i>	<i>83.0 to 86.9%</i>	<i>C</i>	<i>73.0 to 76.9%</i>	<i>D</i>	<i>63.0 to 66.9%</i>
<i>A minus</i>	<i>90.0 to 92.9%</i>	<i>B minus</i>	<i>80.0 to 82.9%</i>	<i>C minus</i>	<i>70.0 to 72.9%</i>	<i>D minus</i>	<i>60.0 to 62.9%</i>

## University Policies

Per [University Policy S16-9](http://www.sjsu.edu/senate/docs/S16-9.pdf) (<http://www.sjsu.edu/senate/docs/S16-9.pdf>), 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 web page](https://www.sjsu.edu/curriculum/courses/syllabus-info.php) (<https://www.sjsu.edu/curriculum/courses/syllabus-info.php>) (<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.

## Course Schedule

Date	Module	Class Date Readings and Topics	Reading from Lehninger 7th edition	Assignments due

1/25	1	<b>Intro to CHEM 130B Bio signaling</b> (Review of Chem 130A)	Chapter 12. Biosignaling	
1/30	1	Enzyme regulation	Chapter 6.5. Regulatory enzymes	
2/1	2	<b>Bioenergetics and Metabolism</b> Metabolic principles	Bioenergetics and metabolism pg 491	
2/6	2	Biological reactions Phosphorylation	Chapter 13.1-13.3 Bioenergetics and reactions	
2/8	2	Oxidation-reduction	Chapter 13.4 Oxidation-reduction reactions	Quiz 1
2/13	3	<b>Glycolysis</b> Investing phase	Chapter 14.1 Glycolysis	
2/15	3	Harvesting phase Fermentation and pyruvate fate	Chapter 14.1 Glycolysis Chapter 14.3 Fates of pyruvate. Fermentation	
2/20		Exam 1		
2/22	4	Gluconeogenesis	Chapter 14.4 Gluconeogenesis	Lit. assignment #1 due
2/27	4	Pentose phosphate pathway	Chapter 14.5 Pentose phosphate pathway	
3/1	5	<b>Metabolic regulation and flux</b>	Chapter 15.1-15.2 Regulation of metabolic pathways and its analysis	
3/6	5	Regulation of carbohydrate metabolism	Chapter 15.3 Glycolysis and gluconeogenesis regulation	Quiz 2
3/8	5	Regulation of carbohydrate metabolism	Chapter 15.5 Regulation of glycogen breakdown and synthesis	

3/13		Exam 2		
3/15	6	Citric acid cycle,	Chapter 16.1, 16.3. Citric acid cycle and its regulation	
3/20	6	Oxidative phosphorylation (1)	Chapter 19.1. The mitochondrial respiratory chain	
3/22	6	Oxidative phosphorylation (2)	Chapter 19.2-19.3. ATP synthesis and regulation of oxidative phosphorylation	
3/27 -3/31		<i>Spring break</i>		
4/3	7	Photosynthesis. Light reactions	Chapter 20.1 -20.3. Light absorption, reaction centers and ATP synthesis	Lit. assignment #2 due
4/5	7	Carbon-assimilation and carbohydrate metabolisms	Chapter 20.5, 20.7, 20.8  Carbon assimilation, starch, sucrose and cellulose. And integration of carbon metabolism in plants	
4/10	8	Lipids  Fatty acid catabolism	Chapter 17.1-17.3. Fatty acids catabolism	Lit. assignment #3 paper selection due
4/12	8	Lipid biosynthesis	Chapter 21.1. Biosynthesis of fatty acids	
4/17	8	Lipid biosynthesis and Lipoproteins	Chapter 21.2, 21.4. Triacylglycerols, Cholesterol	Quiz 3
4/19	9	Amino acids  Amino acid catabolism	Chapter 18.1. Metabolic fate of Amino groups	
4/25	9	Amino acid catabolism	Chapter 18.2, 18.3 Nitrogen excretion and the urea cycle. Amino acids degradation	

4/26		Exam 3		
5/1	10	1C metabolism and review of metabolism	Chapter 22. Biosynthesis of amino acids...	
5/3		Literature Pitch Day		Lit assignment #3 due
5/8	11	Integration of metabolism	Chapter 23.2. Tissue specific metabolism	Quiz 4
5/10	11	Integration of metabolism	Chapter 23.3. Hormonal regulation Fuel metabolism	
5/15		Q&A		
5/23		Tuesday, May 23 7:15-9:30 AM Comprehensive Final Exam – Emphasis on integration		