

# Biochemistry Lab Section 01

## CHEM 131A

Spring 2023 2 Unit(s) 01/25/2023 to 05/15/2023 Modified 01/12/2023

**Class Days/Time:** Tuesday and Thursday 3:00 to 5:50 pm

**Classroom:** Duncan Hall 609.

*Lab 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

Fundamental qualitative and quantitative techniques and methodology in modern biochemistry. This is a laboratory course focusing on the development of intermediate laboratory skills in modern biochemistry using the context of experiments examining biologically relevant molecules. This course is designed to foster skills in proper laboratory practice and record keeping, the use of biochemical instrumentation, the proper interpretation of experimental results, and the effective communication of the results through written reports.

### Course Format

This is an in-person laboratory. Students are expected to attend all the laboratory sessions.

If a contingency arises that stops us from attending campus, some lab sessions may be moved to online

### Requisites

Pre-requisite: CHEM 55, CHEM 55L and CHEM 113A (with a grade of "C" or better; "C-" not accepted).

## \* Classroom Protocols

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Students should read the safety section in the manual and in this module. Note in particular: "Failure to comply with proper procedures and prescribed safety cautions shall subject the student to disciplinary action. 1) Any student engages in unauthorized experimentation, or who seriously disregards safety, thereby endangering self and others shall be withdrawn immediately from the class with a grade of F. 2) Any student who shows persistent disregard for safety may have his/her grade lowered, and may risk being withdrawn with a final grade of F.

### Lab Attendance

Since this is a lab course, students are expected to arrive on time with pre-lab activities done. For many of the experiments, you will work in groups, each group member is expected to participate fully with each experiment. If one or more of your group-mates does not do its job please inform the instructor.

Attendance to laboratory sessions is mandatory. Missing two or more lab sessions without a documented valid excuse is enough to fail the class. Valid excuses include unforeseen force major events like medical situations that require consulting a health professional, jury duty, traffic accidents in the day of the lab, etc. Students may miss ONLY ONE lab session without excuse. If missing a lab session, the student must contact the instructor to find out the options about the report or pre-lab assignments related to that lab session. Students missing more than one lab session must document force major to be able to submit the assignments associated to that lab session.

At SJSU, we hope that the classroom and laboratory 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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When you complete this laboratory course, you will have achieved the following:

- reasonably adept skills with biochemical experimental techniques
- ability to collect appropriately detailed data
- skill at analyzing and interpreting data
- understanding of the limitations of any one dataset
- increased comprehension of the material covered during class sessions

## 📊 Course Learning Outcomes (CLOs)

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Students will learn how to carry out independent experimental work in a laboratory setting while investigating a research problem, utilize appropriate instrumentation and techniques to accomplish this and communicate the results of the work in the form of a clearly written journal article

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

1. Demonstrate understanding of core concepts, methods and limits of scientific investigation to effectively solve problems in biochemistry.
2. Answer questions regarding safe practices in the laboratory and chemical safety.

3. Demonstrate safe laboratory skills (including proper handling of materials and chemical waste) for particular laboratory experiments.

Write a formal scientific laboratory report which applies the scientific approach to address a chemical problem and follows the format and style of an article in a peer-reviewed American Chemical Society journal.

## Course Materials

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### Laboratory Notebook

You need to have a notebook that is bound. In your lab notebook you will do most of the pre-lab work and record data and observations you make during each laboratory. Any bound notebook will suffice. Make sure you write clearly, include all significant figures, and label all units. The clearer you are with your notebook, the easier it will be to write up your laboratory reports.

It is imperative that all experimental data for all experiments is recorded in the laboratory notebook and that this information is kept up to date.

### Lab Manual

The lab manual will be posted on Canvas. Reading and reviewing the given experimental background is expected before coming to lab. The laboratory exercises can be found in the manual and will be supplemented with information on Canvas.

### Lehninger Principles of Biochemistry

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

**Publisher:** Macmillan Learning

**Edition:** Any

**Optional**

It is recommended to use a Basic Biochemistry textbook like the one used for previous or current Lecture class.

### 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 / equipment / material

A personal computer (laptop) able to run basic software and the free software Chimera (<https://www.cgl.ucsf.edu/chimera/>) will be used in several lab sessions

### Safety: Laboratory safety

Students are required to study the safety section in the manual and on the SJSU Catalog under Chemistry Department, and to score over 80% in the safety quiz done in the first week of class

### Pre-lab work

Most pre-lab work will be done in the lab notebook before each lab session. Correctness and general completeness of the lab notebook will be assessed by the instructor during the lab session

### Quizzes

Some experiments will have an online quiz that is required before coming to lab as part of your pre-lab. These will be short and cover the main points of the day's experiment. They are designed to assess preparedness for the lab exercise

### Laboratory Reports

Laboratory reports will be required for most experiments. These are to be completed outside of the laboratory period. The required content of each report will be explained in class, general instructions and a grading rubric for each lab report will be available in the corresponding Canvas assignment.

Laboratory reports must be typed and include figures and tables as necessary. The due dates for submission of specific reports will be provided on the canvas assignment with ample time for preparation. Failure to submit a report by a specified deadline will automatically lower the grade by 5% of the maximum for each day it is late. Notice that those a calendar day not class days, if a report is due Tuesday and it is turned in Thursday same week, the grade will be lowered by 10%. Assignments submitted on the due date but later than the time they are due are considered late one day.

Students will write some "group" lab report during the semester. This is designed to encourage cooperation and participation as well as foster good writing and teaching skills. Each member of the group will receive the same grade for the group report. If any member of the group has not contributed equally to the report up to two days before the due date, that individual must write his or her report alone. It is the responsibility of the group members to let the instructor know if any member of the group is not contributing.

## Final Exam

There will be one final exam. The exam will cover all the theory, experimental protocols and data analysis associated with the experiments. The Final exam must be taken at the time scheduled by the university for that purpose. It is expected that all students will take the final as schedule; make-up exams must be done in the make-up day and require a documented valid excuse

## ✓ Grading Information

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*Pre-lab assignments* are graded based on completeness. Each student must show a full understanding of the experiment or exercise to be completed on the given day. Completeness and quality of the notebook (data from all previous experiments included) may be assessed in any lab session.

The grade for this course is heavily dependent on *lab reports*. Each individual lab report will be graded according to its unique rubric that will be discussed during each separate lab. The required section to be written of the report for each lab will vary, and this variation is indicated and explained in the lab manual, in canvas and during the lab session.

Part of your grade will be an *instructor evaluation*. Instructor evaluation is based on technique, organization, comprehension of experiments, preparation, attendance, involvement in class discussion, involvement in group work, attention to laboratory safety and proper disposal of waste, etc.

An important component of the grade in this course depends on the *Final Exam*. It will cover theory, experimental protocols and data analysis associated with each one of the experiments.

## Determination of Grades

The reports and lab worksheets contribute 66% of the final grade (notice that they each one of them have different value as presented in Canvas). The final exam will contribute 16% toward the grade. The quality of the notebook and all the pre-lab work contributes 12% and the instructor evaluation comprises the remaining 6% of the total.

Most lab reports are due one week after the end of the experiment at the beginning of the lab (submit in canvas before coming to the lab). Lab worksheets are due by the end of the lab session. All pre-lab work (quizzes, prelab worksheets, and lab notebook pre-lab) is due before the corresponding lab session. The lab notebook will be reviewed any time during any/all lab sessions.

Late prelab-work is not accepted. Late reports will be penalized 5% each day they are late.

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

| Assignments                           | points | Percentage |
|---------------------------------------|--------|------------|
| Lab Reports and Worksheets            | 230    | 62%        |
| Lab Notebook Pre-lab work and quizzes | 72     | 20%        |

|                                 |    |     |
|---------------------------------|----|-----|
| Final Exam                      | 50 | 15% |
| Lab Work, instructor evaluation | 20 | 5%  |

## Determination of Grades

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

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

## 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

*The schedule is subject to changes. Changes will be announced in class and in Canvas announcements.*

| Date | Module | Experiment                    | Assignments due                  |
|------|--------|-------------------------------|----------------------------------|
| 1/26 | 1      | Lab orientation*              |                                  |
| 1/31 | 2      | Hypothesis Case Study*        | Safety quiz due                  |
| 2/2  | 3      | Check-in / Nuts and Bolts     | WS Nuts and Bolts Part 1 due 2/2 |
| 2/7  | 4      | Laboratory Ethics*            | WS Nuts and Bolts Part 2 due 2/7 |
| 2/9  | 5      | Formatting a Lab Report*      |                                  |
| 2/14 | 6      | pH & Buffers                  | Buffer Graph due 2/16            |
| 2/16 | 6      | pH & Buffers                  | pH & Buffers report due 2/21     |
| 2/21 | 7      | Protein Structure: 3D Models* | WS due 2/28                      |
| 2/23 | 7      | Protein Structure: 3D Models* |                                  |

| Date        | Module | Experiment  | Assignments due |
|-------------|--------|---|-----------------|
| 2/28        | 8      | QC Biologics*                                     | WS due 2/28     |
| 3/2         | 8      | QC Biologics*                                     | WS due 3/2      |
| 3/7         | 8      | QC Biologics                                      | Report due 3/21 |
| 3/9         | 8      | QC Biologics                                      |                 |
| 3/14        | 8      | Writing Workshop*                                 |                 |
| 3/16        | 9      | Chimera Exercise:<br>Neuraminidase*               |                 |
| 3/21        | 9      | Chimera Exercise:<br>Neuraminidase*               | WS due 3/23     |
| 3/23        | 10     | Computer Programming and<br>Biochemistry: Python* | WS due 3/25     |
| 3/27 – 3/31 |        | Spring break                                      |                 |
| 4/4         | 11     | Enzyme Kinetics*                                  | WS due 4/4      |
| 4/6         | 11     | Enzyme Kinetics                                   | Report due 4/25 |
| 4/11        | 11     | Enzyme Kinetics                                   |                 |
| 4/13        | 11     | Enzyme Kinetics                                   |                 |
| 4/18        | 11     | Enzyme Kinetics                                   |                 |
| 4/20        | 12     | Exploring Carbohydrates                           |                 |
| 4/25        | 12     | Exploring Carbohydrates                           | Report due 4/4  |
| 4/27        | 12     | Exploring Carbohydrates<br>/Exam preparing        |                 |
| 5/2         | 13     | Structural Biochemistry*                          |                 |
| 5/4         | 13     | Structural Biochemistry*                          | WS due 5/11     |

| Date | Module                                | Experiment                            | Assignments due |
|------|---------------------------------------|---------------------------------------|-----------------|
| 5/11 | 13                                    | Structural Biochemistry*<br>Check Out |                 |
| 5/19 | Final exam May 19 2:45-5:00 PM DH 609 |                                       |                 |

*\*Dry labs*