# BENG 152 BioSystems Engineering Lab
**Winter 2024**

**Lab** W 12-4pm 108 Powell Focht Bioengineering Hall.

**Lectures/Discussions**: M 1-1:50 pm, HSS Room 1305; some Fridays same place same time (see schedule)

**Instructors:** Alyssa Taylor, Associate Teaching Professor, atayloramos@ucsd.edu
**GIA:** Carter Rowell, Bioengineering Graduate Student, crowell@ucsd.edu

**Office hours:** will be announced on Canvas. We are very pleased to meet with you and we will have lots of interaction in the lab!

**Welcome to Class, and a Note on Inclusion:** Welcome to BENG 152, and I am excited to have the opportunity to get to know you. It is my intention that students from all backgrounds and perspectives will be well-served by this course, and that the diversity that students bring to this class will be viewed as an asset. I welcome individuals of all ages, backgrounds, beliefs, ethnicities, genders, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, socioeconomic background, family education level, ability – and other visible and nonvisible differences. All members of this class are expected to contribute to a respectful, welcoming and inclusive environment for every other member of the class. We will be working closely together in a lab environment and will have many opportunities to build community. Your suggestions are encouraged and appreciated.

**Text:** Lab Exercises and supplementary materials to be accessed from CANVAS.
Suggested: John Webster, Medical Instrumentation: Application and Design. (Wiley). Any edition will do. It likely will be used for your Bioinstrumentation course.

**Lab Notebook:** See description in Lab 0A Reporting Requirements. Also, you must have your TA initial your lab notebook at the end of each lab.

**Course Learning Objectives**
After successfully completing this class, a student will be able to:
-Utilize a variety of electronic testing equipment, including oscilloscope, function generator, digital multimeter
-Utilize LabView and MatLab to generate and analyze physiological signals
-Implement op-amp circuits
-Solder; troubleshoot and analyze electrical circuits.
-Design and implement filters for signal processing, including ECG and EMG signals
-Utilize Arudino microcontroller for circuit manipulation
-Implement and compare different temperature measurement approaches

-Synthesize electronic instrumentation and signals knowledge to design and implement a system that acquires and processes physiological relevant signals
-Communicate experimental findings in written communication
-Work effectively in a team towards project goals and objectives

**Grading used to assess achievement of learning objectives** (percentages and components are subject to change; these are based on historical allocations)

Prelab submissions: 15%

We are grading for effort here.

Postlab submissions: 20%

We are grading for effort here.

Lab Notebook: 10%.

Graded at end of term; we also initial your entries throughout the quarter to keep you on track.

Major lab write-ups: 25% over 4 pieces – Introduction, Methods, Results, Conclusions.

End of Term Project: 20%

Teaching Team's Appraisal of Performance, Participation, Engagement and Contributions: 10%.

**Lab Equipment and Supplies**

The laboratory has a set of test equipment suitable for a beginning bioengineering laboratory emphasizing electronic instrumentation and signals. Each pair of students will be given a project box of supplies, small tools, electronic chips, etc. These can be stored in the laboratory in the cabinet near your station.

**Work Expectations:**

Partner: You will work with a partner either of your choice or as assigned on the first day of lab session. This quarter is a great opportunity to hone your leadership and team working skills! You'll be able to optimize your teamworking approach, and we are here to support you in this process!

Pre Lab: You are expected to have read the laboratory exercises before coming to class. The prelab exercises are intended to make you read the lab exercise; some have more extended calculations and questions. We expect to grade them on an all or nothing basis for short submissions, and at 10% intervals for more extended submissions.

During Lab: You are expected to work diligently through the assignments during lab and to keep on pace of the schedule.

Post Lab: Due dates for the lab write-ups and instructions will be given - please check Canvas often for updates.

Project: The last weeks of the quarter are dedicated to completing a project in which you design and implement a system that includes biophysical measurement, data acquisition and data processing. You should decide on and then plan your project earlier than the last two weeks. Guidelines will be given so that the projects are manageable. The pair will submit one final project report. Students have in the past embraced this as a creative opportunity for design and hands-on work so we hope you will have fun and learn a lot from this project.

Note: **The labs do not match one-for-one with weeks of the quarter.** You and your partner will often have to complete one lab, and continue on to the next lab exercise during the 4 hour lab period. You are strongly encouraged to work ahead whenever possible so that you can not only finish all the labs but also have plenty of time for your project.

**Learning Expectations**

Your most productive sources of learning are your peers – students in this class. You are encouraged to work with them to gain greater understanding. Feel free to collaborate and share information among teams - we are all in this together and you learn better by teaching others.

However, although working with your peers is encouraged, you are still expected to learn the material to a level of competency where you individually are expert in settings outside this course – e.g., so you can instruct the next set of students or use the techniques for senior design or laboratory work. Accordingly, you must discipline yourself to understand the laboratory exercises yourself and not rely on your lab partners.

## Class Policies

**Integrity of Scholarship**

Academic integrity is of utmost importance. As part of the learning process, discussion of homework assignments with colleagues, TA's, etc., is encouraged, but the final answers you submit must be your own. For the final report, you will be submitting one team-based report however. Cross-team collaboration: It is okay to discuss your misunderstandings on homework/lab reports but it is not okay to simply copy answers from other teams.

You are all college students and professional, and recognize the importance of acting with academic integrity so I don't anticipate any problems but… the Shu Chien-Gene Lay Department of Bioengineering adheres to the UCSD Policy on Integrity of Scholarship and we expect all students to honor this policy. An excerpt of this Policy states that "Students are expected to complete the course in compliance with the instructor's standards. No student shall engage in any activity that involves attempting to receive a grade by means other than honest effort...." Any suspected incident of academic integrity violation will be dealt with in accordance with UCSD policy. According to UCSD policy, consulting any unauthorized material that contains answers to any assignment is academic dishonesty. Any suspected incident will be dealt with in accordance with UCSD policy, including reporting the misconduct to the Dean of Student Affairs and the Academic Integrity Office. More information on UCSD's Policy on Integrity of Scholarship can be found at: https://academicintegrity.ucsd.edu/process/policy.html

**Accommodations for Students Due to a Disability:**

I am committed to ensuring access to classes, course material, and learning opportunities for students with disabilities. Students requesting accommodations for this course due to a disability must provide a current Authorization for Accommodation (AFA) letter issued by the Office for Students with Disabilities (OSD) which is located in University

Center 202 behind Center Hall. Students are required to present their AFA letters to Faculty (please make arrangements to contact me privately, I am very happy to discuss!) and to the OSD Liaison in the department in advance so that accommodations may be arranged. Contact the OSD for further information: 858.534.4382 (phone), osd@ucsd.edu (email), or http://disabilities.ucsd.edu (website).

**Religious Accommodation:** See: EPC Policies on Religious Accommodation, Final Exams, Midterm Exams

It is the policy of the university to make reasonable efforts to accommodate students having bona fide religious conflicts with scheduled examinations by providing alternative times or methods to take such examinations. If a student anticipates that a scheduled examination will occur at a time at which their religious beliefs prohibit participation in the examination, the student must submit to the instructor a statement describing the nature of the religious conflict and specifying the days and times of conflict. In this lab class, we do not hold examinations, but I wanted you to have this information.

**Homework Assignments-** see detailed schedule for due dates, and Canvas. All dates and times are in Pacific Time (San Diego local time).

**Additional Class Policies**

- Homework assignments/class submissions must be written clearly and neatly. Including your lab notebooks. Illegible homework will not be graded. Homework assignments may be discussed in groups but must be worked individually and not copied. No late homework will be accepted or graded. Due dates are firm and exceptions cannot be made. I suggest planning to submit well ahead of the cutoff, to avoid any logistical challenges.
- In fairness to all students, work will only be re-graded when there is evidence of a grading error. We reserve the right to re-grade an entire piece of work, which may result in an overall grade that is lower or higher. The deadline for re-grade requests is within 48 hours from the date grades are posted on Canvas.