

BIOE 385: Bioinstrumentation Laboratory

Fall 2023

Instructor

Dr. James Long
james.long@rice.edu
BRC 765

Teaching Assistants

<i>Monday</i>	<i>Wednesday</i>	<i>Thursday</i>
Robert Heeter rch5@rice.edu	Abi Parthasarathy akp6@rice.edu	Christine Humphrey ceh13@rice.edu
Emilie Novak ein1@rice.edu	Diego Gonzalez dhg1@rice.edu	Rocky Han sh151@rice.edu

Office Hours

Office hours will be held by the TAs on Fridays from 4:00-5:00pm in BRC 230. For best results, please arrive with specific questions.

Course Description

In this laboratory course, you will learn to design, build, and test biomedical instruments using the NI ELVIS system and LabVIEW software. Students will work in pairs to complete a series of closed-ended lab assignments as well as one open-ended design projects. Mastery of instrumentation principles and the course objectives will be evaluated by a diverse set of assignments, with a focus on professional engineering technique and communication.

Course Objectives

By the end of the course, students will demonstrate the ability to:

1. Design, build, and troubleshoot electrical circuits to acquire engineering measurements.
2. Solve open-ended engineering problems, taking resource constraints and design criteria into consideration.
3. Communicate and justify engineering decisions and designs in a written document.

Textbook (Optional)

You may find it helpful throughout the semester to reference *Practical Inventors for Electronics, 4th Edition* by Paul Scherz and Simon Monk. A reference copy of the textbook will be made available to students in the lab, but *it must stay in the lab*. Removal of any reference copies will result in severe penalties.

Attendance Policy

Students are required to attend ALL sessions of the laboratory. Exceptions for illness (including days necessary for mental health), family emergencies, or other excusable absences may be granted with instructor approval on a case-by-case basis. Any make-ups for valid absences must be done at the convenience of the instructor.

Grading Policy

Category	Submissions	Total points	% Final grade
Pre-lab quizzes	Canvas	30	6%
Lab worksheets	In class	40	8%
Technical memos	Canvas	240	48%
Project Demo	In class	40	8%
Final report	Canvas	100	20%
Practical exam	In class	50	10%

Resubmission policy: Categories in green indicate assignments that may be resubmitted for points back, *provided that you earned a grade of at least 50%*. For these assignments, you will have one week from the return of comments to resubmit for up to 100% of points back. You will only have one opportunity for resubmission, and resubmissions may not be submitted late.

Regrade policy: It is inevitable that errors in grading will occur. If you believe that an error was made in grading your assignments, you should directly email the instructor a short justification of your claim. The deadline for regrade requests is one week after the assignment was returned. I will review your claim and regrade your assignment if appropriate.

Late policy: Pre-lab quizzes and lab worksheets will not be accepted late without a valid excuse. Technical memos and the final report will be penalized 25% of the total assignment value per day.

Additional penalties: In addition to technical and communication errors in assignments, penalties may be applied for the following violations: tardiness to lab, unsafe lab practices, leaving your lab area messy, and damaging or losing lab equipment. The penalty will scale with the severity of the infraction. Repeat violations will incur increasingly severe penalties.

Earned letter grade: There is no curve in this course – what you see is you get! The earned letter grades will follow conventional numerical standards based on the cumulative percentage of assignment scores:

- A+: ≥ 97 , A: ≥ 93 , A-: ≥ 90
- B+: ≥ 87 , B: ≥ 83 , B-: ≥ 80
- C+: ≥ 77 , C: ≥ 73 , C-: ≥ 70
- D+: ≥ 67 , D: ≥ 63 , D-: ≥ 60
- F: < 60

Honor Code Policy

Collaboration between group members is expected for the completion of high quality technical memos and lab reports. However, you may not consult the materials from previous years' BIOE 383 or 385 courses, including but not limited to: written reports, posters, data calculations, and code (LabVIEW or otherwise). Additionally, while you may discuss aspects of the lab projects and reports with other groups, your group's submitted work must reflect your individual efforts. In other words, you cannot submit another group's work as your own, and these materials may include but are not limited to: writing, graphs, code, and data calculations. You may not collaborate on pre-lab quizzes or the exam.

In simpler terms, only submit work that is your own or your group's, where appropriate. If you need clarification, please contact the instructor *prior to submission* to avoid an infraction. For a list of standard definitions as outlined by the Honor Council, please see [this link](#).

Commitment to Equitable Learning

This class is committed to an equitable learning environment. Accommodations will be made for students with alternative needs, but it is critical that you alert the instructor in advance of any additional resources you need prior to assignment submission and the final exam. In particular, you must notify the instructor of any alternative testing needs *at least two weeks prior to the final exam*. For additional resources and more information, please visit the [Disability Resource Center](#) and the [Access and Opportunity portal](#).

Safety

Laboratory environments include inherent dangers and thus strict compliance to safety measures is important. All students are expected to work safely and to ask for assistance when uncertain. Absolutely no eating, drinking or gum chewing will be allowed at any place or time in the lab.

Schedule

Please see the [Rice University Academic Calendar](#) for other important administrative dates.

Week	Lab/Topic	Pre-lab quiz	Assignment
1 (08/21)	Introduction to ELVIS		
2 (08/28)	Operational amplifiers	✓	Technical memo 1
09/04	Labor Day: No lab this week		
3 (09/11)	Filters	✓	Technical memo 2
4 (09/18)	Transducers and sensors	✓	Technical memo 3
5 (09/25)	Biomedical signals	✓	Technical memo 4
6 (10/02)	LabVIEW I	✓	Technical memo 5
10/09	Midterm recess: No lab this week		
7 (10/16)	LabVIEW II	✓	
8 (10/23)	Introduction to final project		Technical memo 6
9 (10/30)	Optional: work on final projects		
10 (11/06)	Optional: work on final projects		
11 (11/13)	Optional: work on final projects		
11/20	Thanksgiving recess: No lab this week		
12 (11/27)	Project demos		Final report
Finals	Lab practical exam		