Bioengineering 130L

***Bioinstrumentation Laboratory* (2 units)**
Spring 2017

Course Time: You are enrolled in one of the three following laboratory sessions:

Monday (section 003)	9:10 AM - 12:00 Noon
Wednesday (section 002)	9:10 AM – 12:00 Noon
Friday (section 001)	10:10 AM – 1:00 PM

All labs will be held in MSE 154.

Discussion Section: Wednesday 8:10 AM -9:00 AM
1002 CHASS Interdisciplinary-North

Instructor: Dr. Bahman Anvari
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E-mail: anvarib@ ucr.edu
Office Hours & Location: Wednesdays 12 pm – 1 pm, and by Appointment (MSE 211)

Teaching Assistants: Joshua Burns < jburn006@ucr.edu> (Monday Lab Session)
Matthew Chow <mchow005@ucr.edu> (Wednesday Lab Session)
Zhehao Xiong <zhehao.xiong@gmail.com> (Friday Lab Session)

Laboratory Support: Hong Xu <hongxu@engr.ucr.edu>

Course Objectives: (1) Gain an understanding of some of the fundamental physical principles that underlie the operation of specific types of biosensors;

(2) Acquire skills to build instrumentations for making physiological measurements, and understand the concepts of noise filtering, and signal amplification;

(3) Develop an ability to utilize commercially available instrumentation coupled with computer-based techniques to make biologically relevant measurements;

(4) Gain data analysis skills; and

(5) Develop written communication skills.

IMPORTANT NOTE: YOU MUST TAKE the "Laboratory Safety Orientation (Fundamentals)", "Bloodborne Pathogens", and "Biosafety." Please proceed as follows:

Log into http://ucrlearning.ucr.edu (use your NetID), and take the following trainings

- Laboratory Safety Orientation (Fundamental)
- Bloodborne Pathogens
- Biosafety

Upon completion, obtain "Transcripts" by selecting the "Transcripts" option on the lower right column on http://ucrlearning.ucr.edu.

You must complete these trainings before **BY THE END OF YOUR LAB SESSION DURING THE FIRST WEEK OF THE QUARTER (Week of April 3)**. **You MUST PROVIDE a copy of the TRANSCRIPT at the first lab meeting during the week of April 3. YOU WILL NOT BE ALLOWED TO DO THE LABS IF YOU DO NOT PROIVIDE THE TRANSCRIPT BY THE END OF THE FIRST MEETING.** If you have any questions, please contact Ms. Hong Xu hongxu@engr.ucr.edu before April 3.

Laboratory Schedule

Week of	Topic
April 3	Introductions, Logistics, **Lab Safety Transcripts Due in Laboratory Room**
April 10	**Lab 1**: Virtual Instrumentation, DC Analysis, RC Circuit, Strain Gauge
April 17	**Lab 2**: Bioinstrumentation Filters and Amplifier
April 24	**Lab 3**: Electrocardiogram Measurements
May 1	**Lab 4**: LabView Data Acquisition, Frequency Analysis & Signal Processing
May 8	**Laboratory Practical Test**
May 15	**Lab 5:** Ultrasound Measurements
May 22	**Lab 6:** Respiratory Measurements
May 30	**No Labs**
June 5	**Lab 7:** Biomechanical Measurements & Microfluidics

Laboratory Policies:

You will work in groups. All groups will be identified prior to the first lab. Each member of the group must be an **ACTIVE** participant, and contribute to carrying out the procedures, making the appropriate measurements, and collecting the relevant data.

No Foods or Drinks are allowed in the laboratory. Excessive noise that results in disturbance of other individuals will constitute an unacceptable professional conduct behavior, and may result in your dismissal from the lab.

You must follow all instructions and safety procedures as provided by the instructor, TA, and laboratory support personnel. **Failure to follow instructions will results in your dismissal from the laboratory. You must come to the lab on time since you will need your full three hours to complete the labs. Late arriving individuals will not be allowed to perform the lab and, will not receive any credit.**

There will be NO make up sessions; therefore, you must attend the laboratory sessions at the appropriate times to complete your laboratory exercises.

Grading and Course Policies:

Your grade will be determined based on the following formula:

Laboratory Reports	70%
Practical Test	20%
Active Participation	10%

Your reports will be graded on the basis of your following the required format, clarity, accuracy, and completeness. All reports must be typed single columned, double spaced, with 1 inch margin in all directions and page numbers, and uploaded on iLearn (unless otherwise specified) by designated due time. You must also submit hard copies of your report at the beginning of the next lab session (unless otherwise instructed). You must follow the format of papers published in ***Annals of Biomedical Engineering*** to prepare your report. This formatting includes what the various sections are; how Figures need to be numbered, how the texts and Figure captions need to be presented in terms of fonts (e.g., **bold**, *italic*, etc.); how the references are formatted; etc. An example paper is posted on *iLearn*. Points will be subtracted if you do not follow the format requirement. The following sections must be present in your reports:

Title – Here you provide the title of the lab.

YOUR NAME

Affiliation – Here, include your specific lab section

Abstract – It should be a summary of the lab and not an introduction. It should be self-contained and substantive in nature, presenting concisely the objectives, methodology used, results obtained, and their significance.

INTRODUCTION - In this section, you will need to provide a description of the objectives of the particular exercise.

MATERIALS AND METHODS - In this section, you may simply refer to the handouts that you will receive**. However, if there are any deviations or modifications from the procedure, you must document them in this section.**

RESULTS - In this section, you will report the results that you obtain during the experimentation.

If you are asked to answer specific questions, you answer them in this section while referencing the question in the appropriate section of the handout. For example, you may report your answers as follows:

Answers to questions Q1-Q7 in Part 1:

Similarly, if you are asked to provide data or plots, you report them in this section. Your plots must be appropriately labeled, and have proper units.

DISCUSSION - In this section, you provide additional information relevant to your results, further insights, limitations of your results, procedures, etc., or any discussion that you feel is important and relevant to your exercise. For some of the laboratory exercises, you may be asked to do some literature research to complement your results or further elaborate on them. You will report those findings in this section.

REFERENCS – Provide a list of references that you may have used.

Lab reports are due at the designated due times. NO credit will be given for late submissions. You must attend the lab session to receive credit for your report. No reports without doing the laboratories will be accepted. If you do not attend a lab, you are not allowed to use your partners' data to submit your report. While you may work in team during the lab, your final lab report must be an independently prepared document. In case of emergency situations that may prevent you from attending a lab session, you must provide written documentation so that your situation can be assessed. If approved, you must still perform the lab (on your own) at an alternative time and submit a report.