

## **BE511 Class Syllabus and Schedule - Spring, 2018**

### **Biomedical Instrumentation**

**Instructor:** Prof. Darren Roblyer  
Office: ERB231  
E-mail: [roblyer@bu.edu](mailto:roblyer@bu.edu)  
Office Hours: by appointment

**GTF:** Jean-Marc Tsang Min Ching  
Office: LSEB 248  
E-mail: [jmtsang@bu.edu](mailto:jmtsang@bu.edu)  
Office Hours: by appointment

**Lecture:** Tues and Thurs 3:30pm-5:15pm, EPC 206 (EPIC, 750 Commonwealth Avenue)  
**Lab:** Tues 12:20pm-3:15pm pm ERA 209

**Course Website:** On BU's blackboard Learn <https://lms.bu.edu>

**Textbook:** *None, we will use powerpoints and pdf's posted throughout the semester*

#### **References (optional):**

1. *Medical Instrumentation: Application and Design*. John G. Webster, Ed.; 4th edition, Wiley, New York, 2010
2. *The Art of Electronics* by Horowitz and Hill

#### **Grading:**

Lab Reports 50%  
Homeworks 10%  
Midterm Exam 10%  
Final Exam 10%  
Final Oral Presentation 15%  
Participation 5%

#### **Course Prerequisites:**

ENG BE 491 (Engineering Physiology Labs) and ENG BE 402 (Control Systems in Biomedical Engineering)

#### **Course Description:**

This course is an introduction to biomedical instrument design. We will introduce physiological signals, biomedical sensors, analog signal amplification and filters, digital acquisition, digital filtering and processing, and an overview of several common medical instrumentation platforms. Hands-on implementation of key principles of instrumentation design will be covered in the laboratory portion of the class culminating with students designing and fabricating their own, stand-alone pulse oximeter.

**Course Goals:** Students will understand the major design considerations in biomedical instrumentation. Students will understand the range and capabilities of the most common sensors, conditioning, processing, and analysis methods needed to design and fabricate biomedical instrumentation. Students will achieve proficiency in hands-on analog circuit design and implementation as well as practical methods for signal digitization, digital signal processing, and instrument programming. Students will design, build, and characterize a complete biomedical instrument and justify their design choices.

**General Class Policies:** All students must attend class and lab sessions. Late assignments will be given a zero. There will be no exceptions. Any special circumstances must be discussed with me prior to the due date. Assignments determined to be copied from other class members will be given a zero and students may be subject to more serious disciplinary action per the discretion of the instructor and TA. Grades will be available throughout the semester on the Blackboard Learn site. These posted grades do not necessarily reflect your final course grades as adjustments/curving will likely be applied.

**HW Policy: Submit paper copy to GTF (Jean-Marc), Put in box inside ERA209 Due at 11:59pm on due date.** In addition to the lab, there will be several homework-like problems in each lab assignment that will help to prepare for the next lab. **Each student should submit their own homework solutions.** Groups are encouraged to collaborate and discuss problems, but each group will be required to turn in their own original work and each student must submit separate homework, all work, plots, tables, etc. must be original, no sharing of any kind is allowed.

**Laboratory Policy:** Students will pick groups of 2-3 for the laboratory sections of the course. Each group will submit one laboratory report, typically due the Tuesday following their laboratory. Here are general rules for lab reports:

- Submit paper copy to GTF (Jean-Marc), Put in box inside ERA209. **Due at 11:59pm on due date.**
- **Format**
  - Abstract, Background, Materials and Methods, **Results**, Discussion
  - Concise text: abstract, background, materials and methods should be very short
  - Results section may be longer because of the labview plots you include
  - Single spaced text
  - 1 inch margins
  - Ariel 11pt for text
  - Figure captions/text – Ariel 9pt at a minimum
  - All axes labeled
  - Answer all questions from lab manual
  - Don't leave plots in standard matlab form
    - Data lines/markers must be thicker than matlab default
  - Can show snapshots of Labview Code/Plots in Report