# BME 386 - Bioinstrumentation Laboratory

3 credits, 4 Contact hours
Instructor: Mesut SAHIN, Ph.D.
Course Coordinator: Mesut Sahin, Ph.D.

**Textbook(s)/Materials Required:**
No textbook is required for this course. Supplemental materials will be distributed before each laboratory exercise by the professor.

**Description:**
The main objective of this course is to equip the students with further hands-on experience in Biomedical Instrumentation before taking the Capstone projects. The studio experiments involve both digital and analog circuits designed for practical applications of biomedical measurement systems commonly used in biomedical industry. The topics will cover the application of transducers, sensors, and electrodes for recordings of physiological signals, building circuits for signal conditioning, and acquiring and processing of these signals on the computer. Student will have an opportunity to design a complete instrumentation system at the end as the final project.

**Prerequisites:**
ECE 251, BME 372, BME 373

**This is a required course for the Instrumentation Track.**

**Course Learning Outcomes:**
1. Gain hands-on experience on building and troubleshooting analog and digital circuits commonly used in biomedical engineering,
2. Acquire practical experience about interfacing with the living systems for collection of biological signals,
3. Apply modern engineering hardware and software to collect, analyze and interpret biological signals (such as Data Acquisition Boards and Matlab software),
4. Identify a physiological signal sensing problem and generate a practical bioinstrumentation solution,
5. Develop skills to design and conduct experiments and analyze data,
6. Work in groups as a team on a biomedical engineering problem
7. Communicate the results of an experiment in written format as a report

**Student Outcomes:**

**Student outcome B** - Ability to design and conduct experiments/analyze data
**Related CLO – 3, 5**

Student outcome K - Ability to use the techniques, skills, and modern engineering tools needed for engineering practice
**Related CLO – 1, 3**

Student outcome L: Apply bio/physio insight to BME application
**Related CLO - 4**

Student outcome M-2: Statistically analyze/interpret bio/physio data
**Related CLO – 3, 5**

Student outcome N: Collect and analyze data from living systems
**Related CLO - 2**

**Course Topics:** Biomedical sensors and their usage, acquiring data on the computer and processing in Matlab, non-invasive blood pressure measurement, force measurements with strain-gauge sensors, optical sensing of heart rate from the finger, temperature measurements, measurement of evoked potentials, term project as a group