**BE 120- Biomedical Transducers**

This course is intended to introduce the student to basic concepts in electronics with the intent of understanding the operation and capabilities of a variety of biomedical instrumentation. We will also cover the physiological basis of the physical parameters measured by this instrumentation.

Discussion sections will review lecture material, solve analytical and design-based circuitry problems, address student questions, and also cover the use of KiCAD for circuit design as well as use of SPICE to analyze behavior of various circuits.

**Grading:** 30% Midterm 1, 30% Midterm 2, 40% Final Exam

**List of Topics**

- Ohm's Law / Analysis of Resistor Networks
- Thermistors
- Analog to Digital Converter
- Sensitivity and Precision of measured signals
- OpAmps / Amplifier designs
- Strain Gauges and Load Cells / Wheatstone Bridge
- Blood Pressure Transducer
- Amperometric Glucose sensor
- Coulter Counter
- Instrumentation Amplifier
- Measurement of Bioelectric potentials: ECG, EEG, EMG
- Impedance analysis of R, C, and L
- Wireless charging of implanted devices
- Noise, frequency analysis, and filtering
- Electronic design of hearing aids

**Academic Integrity**
UCLA expects and requires all of its students to act with honesty and integrity, and respect the rights of others in carrying out all academic assignments and projects. Academic dishonesty of any form will not be tolerated. In accordance with UCLA policy, any instance of suspected academic dishonesty will be immediately reported to the Dean of Students Office and zero credit will be given for any work determined to be dishonest. Please refer to the Office of the Dean of Students if you have any questions.
http://www.deanofstudents.ucla.edu/Academic-Integrity

Use of graphing calculators is not allowed in class.

**Additional Information**

- Counseling and Psychological Services (CAPS) exists to support your mental health needs as you pursue your academic goals. CAPS services are designed to foster the development of healthy well-being necessary for success in a complex environment. A variety of services are available including: crisis counseling by phone 24/7, emergency intervention, Individual counseling and psychotherapy, group therapy, psychiatric evaluation and treatment, educational programs and workshops, campus mental health and wellness promotion. Visit https://www.counseling.ucla.edu/ for more information or call 310-825-0768. For emergencies, please contact 911.
- Students requesting accommodations for a disability, including additional time or resources for taking exams, must be registered with the UCLA Center for Accessible Education (CAE; http://www.cae.ucla.edu/) and must submit appropriate documentation from the CAE.
- Title IX prohibits gender discrimination, including sexual harassment, domestic and dating violence, sexual assault, and stalking. If you have experienced sexual harassment or sexual violence, you can receive confidential support and advocacy at the CARE Advocacy Office for Sexual and Gender-Based Violence, 1st Floor Wooden Center West, CAREadvocate@caps.ucla.edu, (310) 206-2465. In addition, Counseling and Psychological Services (CAPS) provides confidential counseling to all students and can be reached 24/7 at (310) 825-0768. You can also report sexual violence or sexual harassment directly to the University's Title IX Coordinator, 2241 Murphy Hall, titleix@conet.ucla.edu, (310) 206-3417. Reports to law enforcement can be made to UCPD at (310) 825-1491.