The Richard and Loan Hill Department of Biomedical Engineering offers graduate programs leading to Master of Science and Doctor of Philosophy degrees in Biomedical Engineering and Bioinformatics, and participates in the Medical Scientist Training Program. The Interdepartmental Concentration in Neuroscience is also available to doctoral students. Areas of study include Cell and Tissue Engineering, Neural Engineering and Rehabilitation, Bioinformatics and Genomics, Medical Imaging, Biomechanics, Biomaterials and Nanobiomolecular Engineering.

Admission and Degree Requirements

- MS in Biomedical Engineering
- PhD in Biomedical Engineering
- MD/MS in Biomedical Engineering

BIOE 430. Bioinstrumentation and Measurements I. 3 or 4 hours.
Theory and application of instrumentation used for physiological and medical measurements. Characteristics of physiological variables, signal conditioning devices and transducers. Course Information: 3 undergraduate hours. 4 graduate hours. Prerequisite(s): BIOS 100 and ECE 115 or ECE 210; and BIOE 310.

BIOE 431. Bioinstrumentation and Measurement Laboratory. 2 hours.
Practical experience in the use of biomedical instrumentation for physiological measurements. Course Information: Prerequisite(s): Credit or concurrent registration in BIOE 430.

BIOE 450. Molecular Biophysics of the Cell. 4 hours.
Introduction to force, time energies at nanometer scales; Boltzmann distribution; hydrodynamic drag; Brownian motions; DNA, RNA protein structure and function; sedimentation; chemical kinetics; general aspects of flexible polymers. Course Information: Same as PHYS 450. Prerequisite(s): PHYS 245 or the equivalent; or approval of the department.

BIOE 500. Interfacial Biosystems Engineering. 4 hours.
Advanced and detailed exposition of the fundamentals of biological systems using quantitative approaches. Areas of concentration include bioinformatics, cell and tissue engineering, and neuroengineering. Course Information: Prerequisite(s): BIOS 442.

BIOE 518. Advanced Drug Delivery Systems. 2 or 3 hours.
Controlled drug delivery systems utilizing polymers, synthesis of different types of devices, and the delivery expected from these devices, and mathematical modeling of delivery systems. Course Information: Same as BPS 518. Prerequisite(s): Consent of the instructor.

BIOE 521. Imaging Systems for Biological Tissues. 4 hours.
Examination of major imaging systems using ionizing and nonionizing energy for characterization of biological tissues and physiological lesions. Course Information: Prerequisite(s): BIOE 420.

BIOE 522. Principles of Polymeric Science and Engineering. 3 hours.
Intermediate polymer science, thermodynamics of polymer solutions, phase separations, MW determination, crystallization, elasticity, kinetics and processing. Course Information: Same as BPS 522. Prerequisite(s): MATH 220 or consent of the instructor.

BIOE 523. Haptics. 4 hours.
Hands-on course on fundamental concepts of haptics technology applied to medical visualization, simulation, and training. Course Information: Same as BVIS 523. Extensive computer use required. Recommended Background: Basic computer programming experience. Class Schedule Information: To be properly registered, students must enroll in one Lecture-Discussion and one Laboratory.

BIOE 560. Processing and Properties of Structural Biomaterials. 4 hours.
Considers the inter-relationships between atomic bonding, atomic/ molecular structure and material processing to provide a fundamental understanding of the properties and performance of advanced biomaterials. Course Information: Prerequisite(s): CEMM 260. Recommended background: Credit in BIOE 460.

BIOE 579. Neural and Neuromuscular Prostheses. 4 hours.
Neuromuscular electrical stimulation for ambulation by paraplegics, upper limb in tetraplegics, of vocal cord and breathing functions, stimulation of bladder, cochlea, retina, and visual cortex. Course Information: Prerequisite(s): Consent of the instructor.