Biomedical Engineering

Modern biomedical engineers face a far different world than those trained even two decades ago. Explosive advances in our ability to probe and understand molecular and cellular processes and their interconnections now make it imperative that the powers of engineering be brought to bear at ever smaller as well as at systemwide levels. This will not only produce new discoveries at the most fundamental levels but also accelerate the translation of these discoveries into practical applications.

Our vision is that future leaders and lasting impact will arise from successfully integrating engineering concepts and approaches across molecular to whole body levels. Moreover, those also trained to integrate the analytical, modeling and systems approaches of engineering with the complex, and sometimes overwhelming, descriptive details of biology will be uniquely positioned to address new and exciting opportunities. We are committed to educating and training the next generation of biomedical engineers with this vision in mind. Consequently, we have leveraged our existing strengths to build our department around the five research programs representing some of the most exciting frontiers: Biomaterials/Tissue Engineering; Cardiovascular Engineering; Imaging; Molecular, Cellular and Systems Engineering; and Neural Engineering. These areas provide exciting training opportunities for students with a variety of backgrounds and interests.

Students seeking the PhD in Biomedical Engineering enroll in three courses each semester and participate in two or three laboratory rotations in the first year. At the end of that year, they take their oral qualifying exam consisting of a 15-minute presentation on one rotation and oral examination over four fundamental topics of biomedical engineering. During the second and third years, students complete their remaining six courses, perform their one-semester teaching assistantship and begin their thesis research. Required courses include one in mathematics, one in computer science, two in life science, and five in biomedical engineering, distributed among three of the five research areas. By the end of the third year, students must complete their thesis proposal. Average time to degree is approximately 5.5 years.

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Degree Requirements

The department offers programs leading to the doctor of philosophy (PhD) in biomedical engineering and combined MD/PhD degrees. The latter degree is given jointly with the School of Medicine.

The doctoral degree requires a minimum of 72 credits beyond the bachelor's level, with a minimum of 36 being course credits (including the core curriculum) and a minimum of 24 credits of doctoral dissertation research. Generally, students complete the core curriculum and research rotations during their first year. Then, upon successfully passing the qualifying examination, they advance to candidacy and complete the balance of their requirements.

Students pursuing the combined degree must complete the degree requirements for both schools. MD/PhD students typically complete the first two years of the medical school pre-clinical curriculum while also performing one or more research rotations, then the remaining requirements for the doctoral degree, and finally the clinical training years of the medical degree. The department generally gives graduate course credits for some of the medical school courses toward fulfillment of course requirements for the PhD degree. This is arranged on an individual basis between the student, his or her academic adviser and the director of graduate studies.