GRADUATE OFFERING IN

Parks College of Engineering, Aviation, and Technology

Manoj Patankar, Ph.D.
Collegiate Dean

Parks College of Engineering, Aviation, and Technology was founded in 1927 as the first such Federally certified school in the United States. The College is housed in McDonnell-Douglas Hall and several separate laboratory facilities on the Frost Campus.

BIOMEDICAL ENGINEERING

David W. Barnett, D.Sc.,
Department Chairperson

The Department of Biomedical Engineering offers a graduate program in Biomedical Engineering leading to the Doctor of Philosophy (Ph.D.) degree. The program focuses on the training of graduates for careers in biomedical engineering research, teaching, and leadership. Our primary goal is the development of knowledge and technology to improve the quality of life for all humanity. Areas of specialization reflect the research interests of the Department faculty members. The Department currently has research laboratories for tissue engineering, biomaterials, bone biomechanics, and electrophysiology. The inherent multidisciplinary nature of biomedical engineering leads to natural research collaborations with other faculty in engineering, science, and medicine. Students may design an education plan that tailors their academic and research training to suit their long-term career goals. The Department also offers a Master of Science (M.S.) degree that allows students to continue their education beyond the baccalaureate and specialize within a particular area of biomedical engineering. The M.S. degree option provides excellent training for students pursuing careers in industry and government.

Master of Science

Master of Science (Research)

Prerequisites

An undergraduate degree in biomedical engineering or a closely related field is required.

Required Courses

BME.500 Seminars;

BME.501 Current Topics I;

BME.502 Current Topics II;

BME.503 Current Topics III; and

BME.504 Current Topics IV.

Additional Requirements

The Master of Science degree in Biomedical Engineering must include 30 credits of academic work. The thesis option leads to the research degree and requires 24 credits of coursework and 6 credits of thesis research. The project option or non-research track requires 27 course credits and three project-research credits. A minimum of 15 course-credits plus the research credits must be in BME. No more than nine credits of 400-level courses may count toward the Master's degree. The entire set of courses must constitute a coherent plan that is consistent with the expertise in the BME Department, the academic background of the student, and the career goals of the student.

Doctor of Philosophy

Prerequisites

An undergraduate degree in biomedical engineering or a closely related field is required. For those applicants from other disciplines, a strong background in mathematics, science, and engineering is essential. While students typically proceed directly from a B.S. to the Ph.D. degree program,

students who have already completed a M.S. degree are also encouraged to apply.

Required Courses

BME.500 Seminars;

BME.501 Current Topics I;

BME.502 Current Topics II;

BME.503 Current Topics III; and

BME.504 Current Topics IV.

Additional Requirements

The Ph.D. degree in BME requires minimally a total of 48 credits of advanced academic work beyond the B.S. degree plus 12 credits of Dissertation Research. Of the 48 credits, a maximum of nine credits may be at the 400 level; all others must be at the 500 or 600 level. Those students who earn an M.S. degree can seek advanced standing for the M.S. Degree course-credits, but not for thesis credits, in pursuit of the Ph.D. degree.

COURSE DESCRIPTIONS

Upper-Division Courses

BME.410 Biosignals (3)

BME.420 Biomechanics (3)

BME.430 Biotransport (3)

BME.431 Advanced Topics in Biotransportation (3)

BME.440 Biomaterials (3)

BME.442 Tissue/Material Interfaces and Related Phenomena (3)

Graduate Courses

BME.500 Seminars (0)
A biweekly departmental lecture-discussion presented by students, faculty, and invited guests. Registration required in the first semester. Seminar attendance expected in all semesters. (Offered every semester.)

BME.501 Current Topics I (1)
Student presentations and discussion of papers selected from current literature. (Offered every Fall semester.)

BME.502 Current Topics II (1)
Prerequisite: BME.501. Continuation of BME.501. (Offered every Spring semester .)

BME.503 Current Topics III (2)
Prerequisite: BME.502. Continuation of BME.502. (Offered every Fall semester.)

BME.504 Current Topics IV (2)
Prerequisite: BME.503. Continuation of BME.503. (Offered every Spring semester.)

BME.505 Data Handling (3)
This course addresses issues of data acquisition, filtering, model fitting, analysis, and visualization. The data will include one-dimensional signals, images, and multidimensional data. The course will serve as a general overview of data handling, and some students may follow with more specialized courses that address the specific topics. (Offered Spring semester.)

BME.506 Ethics and Compromise (3)
Students and faculty will discuss the positive and negative impact of engineering and science on society. Examples and case studies will illustrate the scientific, economic, and social effects of new devices and new knowledge. The discussion will focus on the role of engineers and scientists, the ethical considerations, and the acceptable compromises. (Offered year.)

BME.515 Sensory Systems (3)
Human mechanisms for sensing the environment will be addressed with a focus on the basic neurosciences and supplemented with material from various engineering sources that examine and describe specific sensory mechanisms. More advanced topics will include clinical tests of human sensing capability and efforts to compensate for sensory deficits. (Offered Fall semester.)

BME.520 Continuum Biomechanics (3)
This course will expand on the two-dimensional mechanics typically offered in undergraduate biomechanics courses. The course will introduce and expand on the use of vectors and tensors to describe and analyze stresses and strains in biological tissues as well as complex man-made materials. (Offered Spring semester.)

BME.530 Drug Delivery (3)
Appropriate delivery of a drug requires knowledge of both properties of the drug itself and properties of the body. This course covers the mathematics behind the distribution of a drug in a biological system including the study of drug delivery systems. (Offered Fall semester.)

BME.540 Tissue-Material Interfaces (3)
This course will expand on the concepts introduced in the typical undergraduate biomaterials sequence. In particular, the response of tissues to implanted materials will be studied extensively. (Offered Spring semester.)

BME.541 Tissue Engineering (3)
Beginning with the history of tissue engineering, this course will describe the challenges in developing new functional human tissue including the ethical and legal implications of "designing" tissue, relevant background, and current directions in research and development. (Offered Fall semester.)

BME.593 Special Topics (1-3)
A one-time or trial course.

BME.596 Project Guidance (1-3)
For the M.S. project option.

BME.597 Research Topics (1-3)
For research other than for the thesis or project.

BME.598 Graduate Reading Course (1-3)
An independent study with a faculty member.

BME.599 Thesis Research (0-6)

BME.5CR.90 Master's Degree Study (0)

BME.693 Special Topics (1-3)
A one-time or trial course.

BME.697 Research Topics (1-3)
For research other than dissertation research.

BME.698 Graduate Reading Course (1-3)
An independent study with a faculty member.

BME.699 Dissertation Research (0-6)

BME.6CR.99 Doctoral Degree Study (0)