

## WHAT IS BIOENGINEERING?

Bioengineers use engineering principles to analyze and solve problems in biology and medicine. Bioengineering is a global term that applies to all life sciences and it encompasses biomedical engineering. However, the distinction between bioengineering and

biomedical engineering is frequently blurred and the terms are often used interchangeably.

Bioengineers interact with biologists, physicians, biochemists, therapists, and physiologists to design, develop and manufacture instruments, devices, and software, or to develop new procedures to solve clinical problems.



They are involved in performance and safety testing of new products as well as in establishing the safety standards for medical devices. Recent advances in bioengineering that you may be familiar with include artificial hearts, limbs and joints, laser systems used in corrective eye surgery, and miniaturized devices for detecting insulin levels and automating insulin injections.

Fields of specialization within bioengineering include:

- Bioinformatics
- Bioinstrumentation
- Biomaterials
- Biomedical devices
- Bio-Micro/Nano Electromechanical Systems
- Cellular, tissue and molecular engineering
- Clinical engineering
- Medical imaging
- Molecular imaging
- Rehabilitation engineering

## WHY BECOME A BIOENGINEER?

According to the U.S. Department of Labor's Occupational Outlook Handbook, opportunities for bioengineers are expected to grow faster than the average for all occupations through 2012. The aging of the population and the focus on health issues will increase the demand for better medical devices and equipment.

For example, rehabilitation engineering is growing rapidly to meet the increasing needs of aged patients and patients with disabilities. Current advances in computer-assisted surgery and molecular, cellular, and tissue engineering designed to minimize patient hospitalization time also boost the demand for bioengineering.

The National Association of Colleges and Employers reported that 2008-09 bioengineering graduates with a bachelor's degree received annual starting salary offers averaging \$54,158. Offers to those with a master's degree averaged \$72,071.

Manufacturing industries employed nearly 40 percent of all bioengineers, primarily in the pharmaceutical and medicine manufacturing and medical instruments and supplies industries. Others were employed in universities, hospitals, research facilities within education and medical institutions, teaching, governmental regulatory agencies or as independent consultants.



## BIOENGINEERING AT J.B. SPEED SCHOOL OF ENGINEERING

Speed School's program is unique in that it is Kentucky's first and only integrated undergraduate and graduate program in Bioengineering. The five-year program leading to a Master of Engineering degree includes a required cooperative education component.

As freshmen and sophomores, students develop a solid foundation in engineering principles along with a diverse background in the arts, humanities, and social sciences. Life science courses include Principles of Biology, Cellular and Molecular Biology, and Human Anatomy and Physiology. Lab courses and three semesters of on-the-job learning through the Cooperative Education Program provide hands-on experiences.

At the junior/senior levels, students take core courses in Bioengineering Design, Biotransport and Biocompatibility, Biosystems Controls and Signals, Introductory Bioinformatics, and FDA Regulations and Bioethics.

Graduate students may tailor course selection according to their personal interests and specialize in one of the following areas:

- Bioelectronics and Biomedical Devices
- Bioimaging and Bioinformatics
- Molecular and Tissue Engineering
- Biomechanics and Rehabilitation

## DEPARTMENT HIGHLIGHTS

- Courses are taught by faculty conducting leading-edge research and attuned to the current needs of the industrial sector.
- The curriculum is designed to provide students with a strong engineering background and the ability to translate an idea from the "bench-top to the bedside."
- Undergraduate and graduate students are encouraged to become involved in faculty research projects.
- Students interface directly with clinical and medical faculty within Louisville's world-renown health care facilities: Alliant Health Systems, Frazier Rehabilitation Center, Jewish Hospital, Kentucky Lion's Eye Institute, Kosair Children's Hospital, and Norton Health Care Systems.

For Additional Information:

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