

UB Department of Biomedical Engineering

BS in Biomedical Engineering

Facts About BME@UB

- Faculty: 4
- Affiliated faculty: 12
- Small class sizes
- Average starting salary for Biomedical Engineers: \$56,158
- Degrees offered: BS
- *MS and PhD are projected to begin in the Fall of 2011

Biomedical Engineers:

Some of the well established specialty areas within the field of biomedical engineering are:

• Bioinstrumentation

Bioinstrumentation is the application of electronics and measurement principles and techniques to develop devices used in diagnosis and treatment of disease.

• Biomechanics

Biomechanics is mechanics applied to biological or medical problems. Efforts in biomechanics have developed the artificial heart and replacement heart valves, the artificial kidney, the artificial hip, as well as built better understanding of the function of organs and musculoskeletal systems.

• Biomaterials

Biomaterials describes both living tissue and materials used for implantation. Understanding the properties of the living material is vital in the design of implant materials. The selection of an appropriate material to place in the human body may be one of the most difficult tasks faced by the biomedical engineer.

• Systems Physiology

Systems physiology is the term used to describe that aspect of biomedical engineering in which engineering strategies, techniques and tools are used to gain a comprehensive and integrated understanding of the function of living organisms ranging from bacteria to humans.

• Clinical Engineering

Clinical engineering is the application of technology for health care in hospitals. Clinical engineers are responsible for developing and maintaining computer databases of medical instrumentation and equipment records and for the purchase and use of sophisticated medical instruments.

• Rehabilitation Engineering

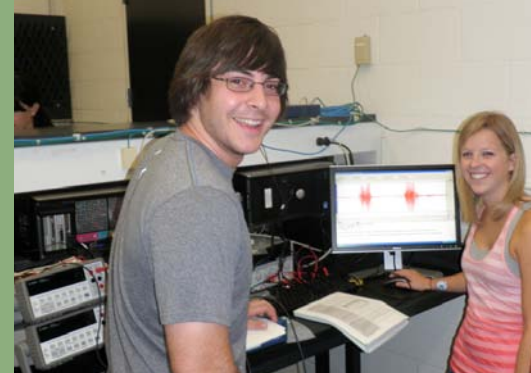
Rehabilitation engineering is a new and growing specialty area of biomedical engineering. Rehabilitation engineers expand capabilities and improve the quality of life for individuals with physical impairments.

What is a Biomedical Engineer?

A biomedical engineer uses traditional engineering expertise to analyze and solve problems in biology and medicine, providing an overall enhancement of health care. Students choose biomedical engineering to be of service to people and to partake of the excitement of working with living systems. Biomedical engineers work closely with traditional engineers, basic scientists, and health care professionals including physicians, nurses and technicians, and may be called upon in a wide range of capacities: to design instruments and devices, to provide knowledge for developing new procedures or advancing scientific research, or to conduct research needed to solve clinical problems.

Where do Biomedical Engineers work?

Biomedical engineers are employed at universities, in industry, in hospitals, in research facilities of educational and medical institutions, and in government regulatory agencies. They often serve a coordinating or interfacing function, using their background in both the engineering and biomedical fields. In industry, they may create designs where an in-depth understanding of both living systems and of technology is essential. They may be involved in performance testing of new or proposed products. Government positions often involve product testing and safety, and establishing safety standards for devices. In the hospital, the biomedical engineer may provide advice on the selection and use of medical equipment, as well as supervising its performance testing and maintenance. They may also build customized devices for special health care or research needs. In research institutions, biomedical engineers supervise laboratories and equipment, and participate in or direct research activities in collaboration with other researchers with such diverse backgrounds as medicine, nursing, biology and chemistry. Biomedical engineers often have advanced training in other fields as well. For example, many biomedical engineers also have an M.D. degree, thereby combining an understanding of advanced technology with patient care or clinical research.



Students get valuable hands-on experience in UB BME lab courses.

Curriculum Overview

Freshman–Sophomore

The first two years build the basic engineering foundation in which students take science, math and required general education courses. While these courses are common to most engineering majors, students in BME also take BE 201 (Principles of Biomedical Engineering), and BE 202 (Applied Medical and Engineering Biology).

Junior

The junior year offers the core courses in Biomedical Engineering where students get hands on experience in their BME laboratory classes in which they learn the essentials of biosignal acquisition among other topics. They also acquire knowledge in the areas of imaging, biomedical circuits, biomaterials, and biofluidmechanics.

Senior

The senior year is where students begin to expand their vision of biomedical engineering by choosing technical electives in areas of interest to them. The program requires that all students work on a senior design project as part of a team; this is an invaluable experience that exposes students to the challenges of seeing a project from conception to realization. In their final semester, students will also be involved with faculty on research projects as part of the required Undergraduate Research course.

UB Department of Biomedical Engineering BS in Biomedical Engineering (BME)

About the Program

Biomedical Engineering at UB is a vibrant, growing department that spans the School of Engineering & Applied Sciences and the School of Medicine & Biomedical Sciences. Our students gain the skills and knowledge needed to solve problems that directly affect the quality of life of all humans. This is accomplished through coursework taught by our outstanding faculty and through hands-on research experiences. Whether you are looking for an exciting career, thinking about graduate school, or planning to start your own biomedical company, a degree in Biomedical Engineering from UB will help you reach your goal.

Events

Events run by the School of Engineering and Applied Sciences and various engineering student organizations are open for undergraduate participation. Upcoming events will be listed on the departmental calendar: www.bme.buffalo.edu.

Opportunities for Students

Several teaching and research opportunities are available for undergraduates through on-campus programs including the Center for Undergraduate Research & Creative Activities (CURCA).

What will the future demand be for Biomedical Engineers?

Biomedical Engineering is the future. The United States Department of Labor reports that "Biomedical engineers are expected to have employment growth of 72 percent over the projections decade [2008-2018], much faster than the average for all occupations." The U.S. Department of Labor report attributed the rapid rise in biomedical engineering jobs in part to an aging U.S. population and the increasing demand for improved medical devices and systems. Specific growth areas cited in the report included computer-assisted surgery, cellular and tissue engineering, rehabilitation, and orthopedic engineering. Clearly the demand for Biomedical Engineers will continue to grow which increases the value of a Biomedical Engineering degree from UB.

How should a student prepare for a career in Biomedical Engineering?

The biomedical engineering student should first plan to become a good engineer and acquire an understanding of life sciences. Good communication skills are also important, because biomedical engineers often provide a vital link among professionals with medical, technical, scientific, or other engineering backgrounds.

High school preparation for biomedical engineering is the same as that for any other engineering discipline, except that life science course work should also be included. Advanced Placement courses in these areas would be beneficial as well. At the college level, the student usually selects engineering as the general area of study, and then chooses a discipline concentration within engineering.

Upon graduation, many students continue their education in a graduate school where they obtain valuable biomedical research experience at the Masters or Doctoral level. When entering the job market, the graduate should ideally be able to point to well-defined traditional engineering skills for application to the biomedical field, with some project or in-the-field experience in biomedical engineering.



BME Assistant Professor
Mark Ehrensberger

BME Assistant Professor Mark Ehrensberger earned his PhD in BME at Syracuse University (2008). His research focus is on characterizing and engineering the microscale electrochemical and biological interactions taking place at the surface of metallic biomaterials utilized in orthopaedic devices. He is also UB|MD Orthopaedic Research Laboratory director.



BME Research Scientist
Julian Lippmann

BME Research Scientist Julian Lippmann earned an MS (2004) and PhD (2008) in ME from the University of California, Berkeley. His research focuses on fabrication, manufacturing and packaging of micro-electromechanical systems (MEMS) for biosensing and drug delivery. Prior to joining UB, he was a senior process engineer at Proteus Biomedical, where he developed biostable packaging for integrated circuit-enhanced pacemaker leads.



BME Assistant Professor
Chulhong Kim

BME Assistant Professor Chulhong Kim earned a PhD in BME at Washington University, St. Louis, Missouri (2009). His research interests are in developing non-ionizing and non-invasive novel biomedical imaging techniques, including photo-acoustic tomography, ultrasound-modulated optical tomography, fluorescence imaging, laser speckle contrast imaging, and ultrasonic imaging.



BME Assistant Professor
Debanjan Sarkar

BME Assistant Professor Debanjan Sarkar earned a PhD in Chemical and Biomolecular Engineering, and Biomaterials Research, from the University of Akron, Ohio. His research interests are in biomaterials and stem cells in regenerative medicine.

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To apply, please visit admissions.buffalo.edu.

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