Biomedical Engineering at the University of Minnesota

INNOVATIVE RESEARCH. HIGH-QUALITY EDUCATION. STRONG CONNECTIONS TO A THRIVING MEDICAL DEVICE INDUSTRY.

Graduate programs

59% of PhD graduates work in industry, 36% work in academia, and 5% pursued additional education or became physicians.

61% of Master’s graduates work in industry, 17% work in academia, and 21% pursued additional education or became physicians.

178 PhD and Master’s students enrolled (47% women).

How to apply

Application requirements:
- Personal and diversity statements
- Letters of recommendation
- Resume/CV
- Unofficial transcript

GRE is optional.

Deadlines:
- PhD: December 15, 2020
- MS: March 31, 2021

Visit bme.umn.edu for instructions.

A location that maximizes opportunity

- Adjacent to the Medical School—less than 100 feet away and connected by tunnels—and other University of Minnesota health sciences.
- The Minneapolis-St. Paul area is home to a major medical device industry and an emerging biotechnology sector; companies include Boston Scientific, Medtronic, 3M, Abbott, Takeda, Biotechne, and Cargill.
- Minnesota boasts one of the world’s top health technology innovation clusters, employing more than 500,000 people.

Downtown Minneapolis  Department of Biomedical Engineering  UMN Medical School & health sciences
Research highlights

**Cardiovascular engineering**
- 3D cardiac bioprinting, such as patches that can be adhered to failing hearts
- Living vascular grafts, heart valves, and vein valves that grow with the body
- Approaches to predict transitions from normal to abnormal cardiac rhythms

**Neural engineering**
- Algorithms and individual predictors for optimizing stimulation therapy outcomes
- Brain devices that can understand thoughts, such as to enable new electroceuticals
- Neural recording, processing, and stimulation chips, with devices in clinical trials

**Cancer bioengineering**
- Re-engineered tumor microenvironments to remove tumor-promoting cues
- Energy-based technologies to improve cancer immunotherapies
- Physics-based predictive models for cancer cell behavior

**Bioinstrumentation & medical devices**
- Implantable brain chips to help amputees control robotic limbs
- How brains respond and adapt to stimulation-based therapies
- Neural interfaces and technologies for hearing loss, tinnitus, and pain

**Biomaterials & micro/nanofabrication**
- Better ways to deliver drugs, such as through biodegradable pumps and polymers
- Microphysiologic systems for studying disease outside the human body
- A nanoparticle platform for antiviral therapy and biomaterials that model diseases

**Immunoengineering**
- Engineering design of physically optimized cell-based immunotherapies
- Designing molecules and nanomaterials that direct immune response against disease
- Models and microfluidic technologies for predicting therapeutic efficacy in vivo

**Biomedical optics & imaging**
- Non-contact optical imaging tools for studying tissue structure and function
- Non-invasive imaging of tissue oxygen and its effect on cancer therapy outcomes
- High-resolution optical mapping techniques to record electrical heart activity

**Biomolecular & cellular engineering**
- How molecules malfunction in diseases like arthritis and Parkinson’s
- Synthetic biology approaches to engineer new protein and cellular functions
- The role of enzymes in aging and neurodegenerative diseases

**Biomechanics**
- How ascending thoracic aortic aneurysms remodel, grow, and fail
- Models to predict cell behavior so therapies can be identified via computer simulation
- Microfabrication and computational methods for understanding cellular adaptation