

# Master of Science Engineering with a Concentration in Biomedical Engineering (MS)

## Biomedical Engineering Program

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[www.odu.edu/eng/programs/biomedical/](http://www.odu.edu/eng/programs/biomedical/) (<https://www.odu.edu/eng/programs/biomedical/>)

The Biomedical Engineering graduate degree programs are available to full-time and part-time students seeking to improve their research and professional skills in biomedical engineering. The programs strive to provide the highest quality engineering education at the graduate level, to engage in scholarly research at the forefront of biomedical engineering, and to serve the biomedical engineering profession. While the biomedical engineering program is administered by the Department of Electrical & Computer Engineering, the program is highly interdisciplinary, and students are admitted from broad areas of engineering, science, and healthcare. Cutting-edge research opportunities and instruction are offered in:

- Bioelectrics and Pulsed Power
- Cellular & Molecular Bioengineering
- Cardiovascular Engineering
- Musculoskeletal Biomechanics
- Plasma Medicine
- Systems Biology & Computational Bioengineering

**Facilities:** The Biomachina Laboratory; the Biomechanics Laboratory; Biomedical Devices and Biomanufacturing Lab; the Cardiac Electrophysiology Laboratory; the Cellular Mechanobiology Laboratory; the Machine Intelligence & HR Communications Lab; the Gene Therapy and Regenerative Medicine Laboratory; the Medical Simulations Laboratory; the Plasma Engineering and Medicine Institute (PEMI); and the Virginia Institute for Imaging and Vision Analysis (VIIVA).

The program also has strong ties to several other on- and off-campus laboratories, including the Applied Research Center at the Jefferson National Laboratory, the Center for Brain Research and Rehabilitation, the Frank Reidy Research Center for Bioelectrics, the Center for Bioelectronics, and the Virginia Modeling, Analysis and Simulation Center (VMASC). Regional, national, and international clinical collaborators support the program. These unique resources position the biomedical engineering program as a leader in education and research in the Southeast and nationally.

## Master of Science Admission Requirements

Admission to the Master of Science, Engineering - Biomedical Engineering program is in accordance with Old Dominion University and Frank Batten College of Engineering and Technology requirements for master's programs as specified in this catalog. Specific additional requirements include the following:

1. Completion of a bachelor's degree in Engineering, Science or Mathematics from an accredited institution, although students from other educational backgrounds may apply with appropriate leveling courses. Accepted students from disciplines other than Biomedical Engineering will be required to complete a number of leveling courses to meet the prerequisites of the program; the Graduate Program Director

will work with the admitted students to create the list of leveling courses, including calculus and differential equations.

2. A minimum GPA of 3.00 (out of 4.0) is required of most students. A student with a lower GPA meeting ODU's graduate admission requirements and with evidence of a high level of professional capability may be eligible for admission to the program upon submission of a petition to the graduate program director.
3. Recent scores, typically, not more than five years old, on the Graduate Record Examination's (GRE) verbal, quantitative, and analytical writing sections must be submitted by all applicants.
4. Two letters of recommendation (typically from faculty in the highest degree program completed when the application is within five years of graduation from that degree program) are encouraged but not required.
5. The applicant must submit a resume and a statement of purpose and goals.
6. Foundation knowledge in physics, basic chemistry, physiology, computer programming, and mathematics (including differential equations and statistics) is expected. Some leveling courses may be required to complement the student's expertise, namely in physiology, statistics, and differential equations.
7. The linked Bachelor's/Master's degree program in the Frank Batten College of Engineering and Technology at Old Dominion University is designed to provide an opportunity for exceptionally qualified engineering undergraduate students to obtain both a bachelors and a master's degree in Biomedical Engineering. Typically, undergraduate students apply at the end of their junior year for admission to the linked programs.

## Curriculum Requirements

The Master of Science program requires completion of 8 three-credit courses and 6 thesis research credits. The five technical electives should be chosen to meet the student's research and career objectives.

### BME Common Core

Select three of the following:	9
BME 720	Modern Biomedical Instrumentation
BME 721	Mathematical Modeling in Physiology
BME 726	Biomaterials
BME 792	Biomechanics

### BME Technical Electives

Select three of the following:	9
BME 554	Introduction to Bioelectrics
BME 562	Introduction to Medical Image Analysis
BME 564	Biomedical Applications of Low Temperature Plasmas
BME 612	Digital Signal Processing I
BME 720	Modern Biomedical Instrumentation
BME 721	Mathematical Modeling in Physiology
BME 724	Neural Engineering
BME 740	Regenerative Medicine
BME 751	Computational and Statistical Methods in Biomedical Engineering
BME 762	Applied Medical Image Analysis
BME 783	Digital Image Processing
BME 795	Special Topics in Biomedical Engineering

<b>Approved Technical Electives*</b>	<b>6</b>
BME 699	Master's Thesis

**Total Credit Hours** **30**

\* The technical elective courses can be selected from the biomedical engineering technical electives or a wide variety of appropriate graduate courses in engineering, biology, chemistry, psychology, computer science, modeling and simulation, mathematics, statistics, or

other programs. Technical electives without the BME prefix must be approved by the graduate program director.