GRADUATE DEGREE PROGRAMS IN THE
STEPHENSON SCHOOL OF BIOMEDICAL ENGINEERING (SBME)

MASTER OF SCIENCE IN BIOMEDICAL ENGINEERING
DOCTOR OF PHILOSOPHY IN BIOMEDICAL ENGINEERING

Biomedical Engineering is the use of engineering principles and technology to solve problems in medicine and biology. The goal of biomedical engineering research is to understand living systems and develop new and improved devices and products for medicine and biology. SBME graduate degrees provide an in-depth biomedical engineering education for students seeking careers in industry, medicine, business and other fields related to biotechnology.

The University of Oklahoma (OU) has a rich research history in biomedical engineering based on widespread collaborative activities between professors on the Norman and Health Sciences Center campuses. The origin of biomedical engineering at OU goes back several decades with early research toward creating an artificial liver and pioneering work in the use of thermography for mammograms. Continued research has led to important discoveries in the areas of blood substitutes, electrocardiology, implantable devices, software development, and tissue engineering.

The OU College of Engineering received a special opportunity grant in 1999 from the Whitaker Foundation to establish the University of Oklahoma Biomedical Engineering Center (OUBC) and to create a graduate program. Officially established as a degree program in 2003, the interdisciplinary degrees in biomedical engineering are designed to increase the knowledge of biological systems and to detect and treat disease through the use of engineering principles and techniques. The program draws faculty resources from the OU Schools of Aerospace and Mechanical Engineering (AME), Chemical, Biological and Materials Engineering (CBME), Electrical and Computer Engineering (ECE), and the University of Oklahoma Health Sciences Center (OUHSC). In 2016, these interdisciplinary degree programs were moved into the Stephenson School of Biomedical Engineering (SBME), which was established in the College of Engineering due to the rapidly growing biomedical research community and increased education needs. SBME faculty members conduct research in the areas of medical imaging, nanomedicine, neural engineering, biomaterials, and regenerative medicine.

Our philosophy for education is to provide a solid core of knowledge through broad-based, rigorous coursework and a multidisciplinary research experience on thesis/dissertation project. Life science courses (e.g. physiology, molecular biology) complement graduate offerings in biomedical engineering with minimum coursework credit hour requirements for the M.S. and Ph.D. of 30 and 90 hours, respectively. In collaboration with Institute for Biomedical Engineering, Science and Technology (IBEST) at the University of Oklahoma, students work closely with scientists, physicians and engineers to learn experimental and quantitative approaches to investigation and design. Our primary goal is to have skilled and knowledgeable graduates prepared for industrial, academic, entrepreneurial or government careers.

Any student with an undergraduate degree in engineering from an accredited school may be admitted as a student in full standing. It is required that students entering the program without biomedical engineering/life science background have to take at least one course related to life science, preferably a physiology course or a quantitative physiology course, either at the undergraduate higher division level or graduate level. A student with an undergraduate degree in the sciences may be admitted on the condition that specified undergraduate engineering and/or mathematics courses will have to be taken for completion of the degree program, which will depend on the background of each individual student. While here, the Masters and Doctoral students will continue to follow the general procedures of the Graduate College for their level of degree as well as the procedures at the Stephenson School of Biomedical Engineering.
MASTER OF SCIENCE

The M.S. degree program requires thirty semester hours and can normally be completed in two years. A thesis is required. Course work requirements for the Master of Science degree in Biomedical Engineering are the following:

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<thead>
<tr>
<th>Course</th>
<th>Hours</th>
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<tbody>
<tr>
<td>Bioengineering Principles</td>
<td>3</td>
</tr>
<tr>
<td>Three elective courses in bioengineering (graduate credit, see list below)</td>
<td>9</td>
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<tr>
<td>Two elective courses in the life sciences (graduate credit, chosen from the list below of approved life science courses)</td>
<td>6</td>
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<tr>
<td>Two elective courses in engineering, science, or math (graduate credit)</td>
<td>6</td>
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<tr>
<td>M.S. Research Thesis course</td>
<td>6</td>
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<td><strong>TOTAL</strong></td>
<td><strong>30</strong></td>
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DOCTOR OF PHILOSOPHY

The Ph.D. degree in Biomedical Engineering requires ninety post-baccalaureate hours, which include the courses required for the M.S. degree in Biomedical Engineering and a minimum of nine additional hours of graduate level courses. Research credits make up the balance of the ninety hours. Three hours of this additional course work must be in the life sciences (graduate credit, chosen from the list below of approved life science courses), and the other six hours can be selected from engineering, science, or math courses (graduate credit) in consultation with the student’s research supervisor and advisory committee. A student with a B.S. degree can enter the Ph.D. program directly; the student does not have to complete the M.S. thesis as part of the Ph.D. degree. At the end of the program, the student will demonstrate excellence in scholarly research by authoring and successfully defending a Ph.D. dissertation. Outstanding students may also want to apply for the M.D./Ph.D. program offered in conjunction with the OU Medical School in Oklahoma City.

During the Ph.D. program, the student is required to take a general examination in accord with Graduate College requirements. For students entering with a B.S. degree, the general examination must be taken as soon as possible after the student has completed three semesters (not including the summer semester). For students entering with an M.S. degree, the general examination must be taken as soon as possible after the student has completed one semester (not including the summer semester).

Courses and Electives in the Biomedical Engineering Program

**Biomedical Engineering Electives:**

- AME G5213 - Biomechanics I
- ME/CHE G5293 - Transport in Biological Systems
- CHE G5243 - Biochemical Engineering
- CHE G5373 - Tissue Engineering
- ECE 4823 – Engineering Principles of the Human Body
- ECE G5823 - Bioinstrumentation
- ECE G5843 - Medical Imaging Systems
- ECE G6813 - Advanced Topics in Biomedical Engineering
- ECE 5853 – Biomedical Signals and Systems
- ECE 5973 – Medical Imaging Informatics

**Life Science Courses:**

- CHEM G3653 - Introduction to Biochemistry
- CHEM G5853 - Principles of Biochemistry II
- CHEM 5291 – Seminar - Biochemistry
- CHEM 5260 Special Topics in Biochemistry I or II
- HES G5823 Exercise Physiology
- HES G5833 Advanced Exercise Physiology Lab
- HES G5863 Physiology of Aging
- MBIO G4833 Basic Immunology
- MBIO G5620 Investigations in Microbiology
- MBIO G5843 Introduction to Molecular Biology
- MBIO G5971 Seminar in Microbiology
- BIOL G3101 Principles of Physiology Lab
- BIOL G3103 Principles of Physiology
- BIOL G3333 Genetics
- BIOL G3342 Genetics Lab
- BIOL G4913 Quantitative Biology
- BIOL G5364 Transmission Electron Microscopy
- BIOL G5374 Scanning Electron Microscopy
- MBIO 5620  Water Microbiology
- BIOL 5833  Introduction to Neurobiology
- BIOL 5871  Current Topics in Neurobiology
- BIOL 5893  Behavioral Neurobiology
- PSY 3203  Cognitive Psychology
- PSY 4253  Perceptual and Cognitive Neuroscience
- PSY 4920  Clinical Psychology