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ADMISSIONS DEADLINES

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REGISTRATION & ADVISING

Registration takes place each semester on dates announced by the University. Detailed instructions for registration plus necessary materials are mailed directly to all graduate students enrolled during the previous semester.

All master’s students in the department must register each semester until all degree requirements are completed. The master’s degrees must be completed within six years from the time the student is admitted to graduate standing.

- **Full-time:** 9 credits or more
  Normally students register in this category until they have earned the total number of credit hours required for their degree. Master’s students register for 9 hours of courses and/or research each semester until 30 hours are completed.

- **Part-time:** 1-8 credits. This option is typically not available for international students. The one exception is if the student is in the final semester and his/her F-1 Application for a Reduced Course Load is approved by the Office of International Students and Scholars (OISS).

- **Inactive:** Students who have not completed their course requirements but who, because of personal reasons, must suspend their studies temporarily may register as inactive students with the approval of their advisor, the Director of Master’s Studies. Not available for international students.

**Academic Advisor:** Each entering master’s student will be assigned an academic advisor by the Director of Master’s Studies. This advisor will be a full-time faculty member in the Department of Biomedical Engineering and will be responsible for acquainting the student with degree requirements.

**ACADEMIC INTEGRITY**

All students in the School of Engineering & Applied Science are expected to conform to high standards of conduct. This statement on student academic integrity is intended to provide guidelines on academic behaviors that are not acceptable. Please visit the Engineering Student Services website for examples of violations and a link to the University-wide policy.

http://engineering.wustl.edu/current-students/student-services/Pages/academic-integrity-policy.aspx

**INDEPENDENT STUDY**

A maximum of 3 credits of independent study (BME 500 or BME 5799) may be counted toward a master’s degree. Registration for independent study requires approval by the Director of Master’s Studies. MS students pursuing a thesis should not plan to register for independent study.
MASTER OF SCIENCE PROGRAMS

REQUIREMENTS
A maximum of six units of graduate credit obtained at institutions other than Washington University may be applied toward the MS degree awarded by Engineering. Transfer credit must be recommended and approved by the Director of Master’s Studies as well as by the Engineering Registrar. No courses carrying grades lower than B can be accepted for transfer credit. Up to two 400 level courses may be counted toward your elective courses.

BS/MS and MS students must maintain the School’s minimum cumulative GPA requirement of 2.7, which is a B-average.

Two options exist for the Master of Science (MS) degree, thesis and non-thesis:

**Thesis option:** For this option, a minimum of 24 credits of course work is required, with the balance being thesis research. The courses must fulfill the core curriculum requirement (see the “Course Selection” section). The remainder of the coursework is generally driven by the student’s research interest. Students must declare the thesis option before the second semester of MS studies begins. Thesis mentors can be any faculty member who is part of the BME Graduate Group.

Thesis students must register for E62 BME 599 Master’s Research (up to 6 credits) for each semester s/he conducts research.

Upon completion of the thesis, the candidate must pass an oral defense conducted by his/her thesis committee. This will consist of a public presentation followed by questions from the committee. Candidates must have a cumulative grade point average of 2.7 or better to receive the degree.

**Thesis Committee:** Students preparing a thesis for the Master of Science will have a three-member thesis committee appointed by the Director of Master’s Studies and headed by the research mentor. This committee will be responsible for hearing, critiquing and approving the student’s thesis.

Students propose committee members to the Director. Following Director approval, the student invites the faculty to join his/her committee.

Students are encouraged to establish their committees and schedule their thesis defenses early; the deadlines for finalizing a committee are as follows:

- October 31 for December graduates
- March 31 for May graduates
- June 30 for August graduates

**Non-thesis (Course) option:** Candidates must accumulate a total of 30 graduate credits, have a cumulative grade point average of 2.7 or better, and satisfy the core curriculum requirements. The balance of the course credits should be selected with a view toward coherence reflecting a specialization in a research area.

Seminars
Each year the department sponsors or participates in a series of seminars by visiting lecturers and Washington University faculty and students. All full-time MS students are required to enroll in E62 BME 501 Graduate Seminar, which is a pass/fail course carrying no credit. A passing grade is required for each semester for all full-time students and is earned by regular attendance at these events. The number of required seminars is determined each semester but will not be more than 1 per week.
COURSE SELECTION

MS students formulate their course program in consultation with their academic advisor. The core curriculum to be completed by MS students requires:

- Two graduate courses in the area of life sciences
- One graduate course in the area of mathematics
- One graduate course in the area of computer science
- 3 BME courses as specified by the following list

Educational Programs and Constituent Courses
Current as of Summer, 2016. For the most up-to-date information, please go to bme.wustl.edu

General Biomedical Engineering
BME 5771 Biomedical Product Development
BME 5772 Biomedical Business Development

Biomaterials & Tissue Engineering
BME 524 Tissue Engineering
BME 564 Orthopedic Biomechanics – Cartilage/Tendon
BME 565 Biosolid Mechanics
MEMS 5560 Interfaces and Attachments in Natural and Engineered Structures
MEMS 5607 Introduction to Polymer Science & Engineering

Cardiovascular Engineering
BME 562 Mechanics of Growth and Development
BME 574 Quantitative Bioelectricity and Cardiac Excitation
BME 575 Molecular Basis of Bioelectrical Excitation
BME 5901 Integrative Cardiac Electrophysiology

Imaging
BME 589 Biological Imaging Technology
BME 5907 Advanced Concepts in Image Science
BME 593 Computational Methods for Inverse Problems
BIOL 5146 Principles and Applications of Biological Imaging
CSE 568M Imaging Sensors
ESE 438 Applied Optics
ESE 588 Quantitative Image Processing
PSYCH 4450 Functional Neuroimaging Methods

Molecular, Cellular, and Systems Engineering
BME 537 Computational Molecular Biology
BME 5610 Protein Structures and Dynamics
BME 5903 Physical Methods for Biomedical Scientists
BME 5913 Molecular Systems Biology: Computation & Measurements for Understanding Cell Physiology and Disease
BIOL 5311 Dynamics in Mesoscopic Molecular Systems
BIOL 5312 Macromolecular Interactions

Neural Engineering
BME 471 Bioelectric Phenomena
BME 533 Biomedical Signal Processing
BME 572 Biological Neural Computation
ESE 546 Dynamics & Control in Neuroscience
Courses that fulfill:

**Life Sciences requirement**
- BME 530A Molecular Cell Biology for Engineers
- BME 503A Cell & Organ Systems
- BME 538 Cell Signal Transduction
- BME 5902 Cellular Neurophysiology
- BME 5909 Physiology of the Heart
- BIOL 4071 Developmental Biology
- BIOL 4580 Principles of Human Anatomy & Development
- BIOL 4810 General Biochemistry
- BIOL 4820 General Biochemistry II
- BIOL 5068 Fundamentals of Molecular Cell Biology
- BIOL 5319 Molecular Foundations of Medicine
- BIOL 5051 Foundations in Immunology (4Cr)
- BIOL 5053 Immunobiology (4Cr)
- BIOL 5062 Central Questions in Cell Biology
- BIOL 5224 Molecular, Cell, and Organ Systems
- BIOL 5285 Fundamentals of Mammalian Genetics
- BIOL 5352 Developmental Biology
- BIOL 5488 Genomics
- BIOL 5571 Cellular Neurobiology (4Cr)
- BIOL 5651 Neural Systems
- BIOL 404 Laboratory of Neurophysiology
- BIOL 548 Nucleic Acids and Protein Biosynthesis
- BIOL 5663 Neurobiology of Disease

**Mathematics requirement**
- BME 5912 Applied Mathematics for Biomedical Sciences
- BME 593 Computational Methods for Inverse Problems
- ESE 501 Mathematics of Modern Eng. I
- ESE 502 Mathematics of Modern Eng. II
- ESE 517 Partial Differential Equations
- ESE 520 Probability and Stochastic Processes
- MATH 449 Numerical Applied Mathematics
- PHY501 Methods of Theoretical Physics I
- PHY502 Methods of Theoretical Physics II
- PHY503 Advanced Math Methods for Physicist & Eng. I
- PHY504 Advanced Math Methods for Physicist & Eng. II

**Computer Science requirement**
- BME 550 Numerical Methods for Computational Modeling in Biomedicine
- CSE 501N Programming Concepts and Practice
- CSE 502N Fundamentals of Computer Science
- CSE 503S Rapid Prototype Development and Creative Programming
- CSE 504N Object-oriented Software Development Lab
- CSE 511A Introduction to Artificial Intelligence
- CSE 515T Bayesian Methods in Machine Learning
- CSE 517 Machine Learning
- CSE 543T Algorithms for Nonlinear Optimization
- CSE 554A Geometric Computing for Biomedicine
- CSE 555 Computational Photography
- CSE 559A Computer Vision
- CSE 5411 Advanced Algorithms
- MEMS 5515 Numerical Simulation in Solid Mechanics I

Some courses fall into multiple categories but can only be used to fulfill a single degree requirement.
Additional courses may fulfill the life science, mathematics or computer science requirements, dependent upon your background and at the discretion of the Director of Master’s Studies.

The normal load for MS students engaged in classroom instruction is 12 credits per semester, though 9 credits is considered full-time. A graduate student registered for research credits is automatically classified as full time whether or not additional courses are taken. Up to two 400-level courses may be counted toward the 30 credits of graduate coursework required for the MS (not including independent study courses, journal clubs or seminar-based courses).

For additional requirements for the MS degree, see the School of Engineering and Applied Sciences website at: https://engineering.wustl.edu/current-students/student-services/Pages/graduate-catalog.aspx#MastersDegree

Bachelor's/ Master's (BS/ MS) Additional Information

BS/MS students may transfer 6 credits of shared coursework from their BS toward the MS upon the approval of the Director of Master’s Studies. These transfer/shared credits must be determined at the first advising session and be sent to the registrar’s office for notification and approval.

Master of Engineering in Biomedical Innovation (MEng-BMI)

The MEng is a 12-month intensive, hands-on program for students seeking to hone their engineering skills and acquire the entrepreneurial skills necessary to convert great ideas into products that benefit people. This professional training program allows students to develop a well-rounded skillset comparable to engineers with multiple years of industry experience.

Requirements

Students are required to take the core curriculum courses. Only 6 of the 30 graduate course credits may be transferred from another university and are subject to approval by the Director of Master’s Studies. Only the MEng electives can be satisfied in this manner. Students in the MEng program must maintain the School’s minimum cumulative GPA of 2.7, which is a B- average.

Core Curriculum – 24 CR

SUMMER – 7Cr
BME 5701 Mastery of Engineering Skills for Biomedical Innovators – 3Cr
BME 5711 Ideation of Biomedical Problems and Solutions – 3Cr
BME 5721 Analysis of Biomedical Market Needs – 1Cr

FALL – 10Cr
BME 5702 Application of Advanced Engineering Skills for Biomedical Innovators – 3Cr
BME 5712 Implementation of Biomedical Solutions – 3Cr
BME 5722 Feasibility Evaluation of Biomedical Products – 3Cr
BME 5731 Business Foundations for Biomedical Innovators – 2Cr

SPRING – 7Cr
BME 5713 Translation of Biomedical Solutions to Products – 4Cr
BME 5723 Realization of Biomedical Products in the Marketplace – 1Cr
BME 5732 Entrepreneurship – 2Cr
Electives* – 6 Cr
Targeted Electives (6CR) must be approved by the Director of Master’s studies.

Other Policies

Secretarial Service
Department secretaries do not generally provide clerical services to graduate students except in connection with scheduled courses and sponsored research projects.
Copyng Service
Graduate students may not charge copying work to the department or a research project without prior authorization. Personal copies can be charged to a student's personal account. The cost of copying dissertations beyond the three copies required by the department is considered a personal obligation.

This is a compilation of policies and regulations applicable to graduate students in the Department of Biomedical Engineering. Students should also become familiar with the general regulations of the Henry Edwin Sever Graduate School of Engineering and Applied Science as described in the School’s Web site: www.engineering.wustl.edu

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Websites
https://bme.wustl.edu/graduate/Pages/degree-programs.aspx
https://engineering.wustl.edu/current-students/student-services/Pages/graduate-catalog.aspx