Biomedical Engineering, Ph.D.

Biomedical engineering is the application of engineering tools for solving problems in biology and medicine. It is an engineering discipline that is practiced by professionals trained primarily as engineers, who specialize in medical and biological applications. The area of study combines fundamentals of the biomedical sciences with advanced engineering methods of analysis and design, and brings together these two fields in order to contribute to the design of new medical instruments and devices, apply engineering principles for understanding and repairing the human body and other biological systems, and use engineering tools for decision making and cost containment.

The interdisciplinary degree program offers a course of graduate study leading to the master of science or the doctor of philosophy degrees in biomedical engineering. The Department of Biomedical Engineering should be of interest to students who wish to practice engineering or engage in research in an engineering specialization in medicine and biology. An individualized course of study is planned with a faculty advisor. Biomedical engineering faculty and affiliated faculty come from the various colleges and professional schools throughout the university. They specialize in biomedical engineering areas as diverse as biomechanics, bioinstrumentation, biomedical imaging and biophotonics, micro and nano technology, systems biology, biomaterials, cellular engineering, tissue engineering, neuroengineering, and rehabilitation and human performance. A list of biomedical engineering faculty, affiliated faculty, and their respective areas of specialization is available from the department website.

REQUIREMENTS

MINIMUM DEGREE REQUIREMENTS AND SATISFACTORY PROGRESS

To make progress toward a graduate degree, students must meet the Graduate School Minimum Degree Requirements and Satisfactory Progress (http://guide.wisc.edu/graduate/#policiesandrequirementstext) in addition to the requirements of the program.

DOCTORAL DEGREES

Ph.D.

MINIMUM GRADUATE DEGREE CREDIT REQUIREMENT

60 credits (30 credits beyond the M.S. degree requirements)

MINIMUM GRADUATE RESIDENCE CREDIT REQUIREMENT

32 credits

MINIMUM GRADUATE COURSEWORK (50%) REQUIREMENT

Half of degree coursework (30 credits out of 60 total credits) must completed in graduate-level coursework; courses with the Graduate Level Coursework attribute are identified and searchable in the university's Course Guide (http://my.wisc.edu/CourseGuideRedirect/BrowseByTitle).

PRIOR COURSEWORK REQUIREMENTS: GRADUATE WORK FROM OTHER INSTITUTIONS

Allowed only if approved by the student’s graduate program. Prior graduate coursework from other institutions may not count toward the minimum graduate residence credit requirement.

PRIOR COURSEWORK REQUIREMENTS: UW–MADISON UNDERGRADUATE

Fulfillment of Minimum Graduate Degree Credit Requirement with prior UW–Madison undergraduate coursework is allowed up to 6 credits numbered 700 or above in engineering-degree-granting programs or from the approved list. Coursework earned five or more years prior to admission to a master's degree is not allowed to satisfy requirements. Prior coursework from the UW–Madison undergraduate career may not count toward the minimum graduate residence credit requirement.

PRIOR COURSEWORK REQUIREMENT: UW–MADISON UNIVERSITY SPECIAL

A maximum of 15 credits from the UW–Madison University Special student career may count toward program requirements.

Minimum graduate resident credits requirement and minimum graduate degree credit requirement: allowed up to 15 credits numbered 300 or above.

Minimum graduate coursework (50%) requirement: allowed up to 15 credits numbered 700 or above.

Coursework earned five or more years prior to admission to a master’s degree is not allowed to satisfy requirements.

CREDITS PER TERM ALLOWED

15 credits

PROGRAM-SPECIFIC COURSES REQUIRED

PHYSIOL 335 Physiology or 3 credits other bioscience such as cell biology; at least 15 credits of courses in an area of specialization (e.g., bioinstrumentation, biomedical computing, biomedical signal processing, biomaterials, biomechanics, rehabilitation engineering); at least 12 credits of engineering coursework 400 level or above; two semesters of graduate seminars. All course choices require prior approval and must meet the spirit of the biomedical engineering degree.

DOCTORAL MINOR/BREADTH REQUIREMENTS

Breadth is provided via interdisciplinary training (minor requirement waived): The central aim of biomedical engineers is to unravel gaps in
biological knowledge through the use of engineering principles. Thus, the doctoral program is inherently interdisciplinary. Prior to obtaining a Ph.D. warrant, students will prepare a summary of their effort in interdisciplinary coursework and training. The purpose of the summary will be to document the effort to meet the spirit of the minor requirement. The summary must be approved by the student’s thesis committee and filed with the department. Students may elect to pursue a doctoral minor.

OVERALL GRADUATE GPA REQUIREMENT
3.00 GPA required.

OTHER GRADE REQUIREMENTS
The Graduate School requires an average grade of B or better in all coursework (300 or above, not including research credits) taken as a graduate student unless conditions for probationary status require higher grades. Grades of Incomplete are considered to be unsatisfactory if they are not removed during the next enrolled semester.

PROBATION POLICY
The Graduate School regularly reviews the record of any student who earned grades of BC, C, D, F, or Incomplete in a graduate course (300 or above), or grade of U in research credits. This review could result in academic probation with a hold on future enrollment or in being suspended from the Graduate School.

ADVISOR / COMMITTEE
Every graduate student is required to have an advisor. An advisor is a faculty member from the major department responsible for providing advice regarding graduate studies. An advisor generally serves as the thesis advisor. In the case where no thesis adviser has been identified, an advisor such as the associate chair for graduate advising is assigned to incoming students. Students can be suspended from the Graduate School if they do not have an advisor.

To ensure that students are making satisfactory progress toward a degree, the Graduate School expects them to meet with their advisor on a regular basis.

ASSESSMENTS AND EXAMINATIONS
Candidates are required to pass a comprehensive qualifying examination and preliminary examination.

Doctoral students are required to take a comprehensive preliminary/oral examination after they have cleared their record of all Incomplete and Progress grades (other than research and thesis). Deposit of the doctoral dissertation in the Graduate School is required.

TIME CONSTRAINTS
Candidates are required to pass a comprehensive qualifying examination taken within two years of entering the graduate program. Candidates are required to prepare their preliminary examination within one year after competition of their qualifying exams.

LANGUAGE REQUIREMENTS
No language requirements.

ADMISSIONS
To be admitted to the program, applicants normally are required to have an undergraduate degree in engineering (biomedical, chemical, electrical, industrial, mechanical, etc.) or physical science from an ABET-accredited program or its equivalent. Each application is judged on the basis of previous academic record, Graduate Record Exam (GRE) scores for the general test, three letters of recommendation, and the statement of purpose. Students admitted to the program may be required to satisfy deficiency course requirements.

LEARNING OUTCOMES
KNOWLEDGE AND SKILLS
• demonstrate an ability to synthesize knowledge from a subset of the biological and physical sciences.
• conduct original research.
• demonstrate an ability to create new knowledge and communicate it to their peers.

PROFESSIONAL CONDUCT
• fosters ethical and professional conduct.

PEOPLE