DOCTOR OF PHILOSOPHY IN THE FIELD OF BIOMEDICAL ENGINEERING

The PhD program in biomedical engineering is strongly interdisciplinary and designed to prepare students to apply engineering principles to problems in medicine and biology, to understand and model multiple attributes of living systems, and to use this knowledge to develop novel biomedical systems and devices. Students can choose from among a wide array of areas of study, mentored by both core departmental faculty and external faculty from the School of Engineering and Applied Science and other schools of the University. These faculty members qualify on the basis of their expertise and teaching abilities for joint or secondary appointments in the Department of Biomedical Engineering. Core faculty expertise includes cancer therapy, cardiac electrophysiology, biosensors, microfluidics, ultrasound applications in medicine, and medical imaging and image analysis.

The program is offered on GW's main campus in Foggy Bottom and takes full advantage of the close proximity of the department to the University's School of Medicine and Health Science, Milken Institute School of Public Health, and GW Hospital. Their interactions are supplemented by collaborations that take advantage of nearby clinical and research facilities, including the Children's National Health System and federal agencies such as the Food and Drug Administration and National Institutes of Health.

Visit the department website (https://www.bme.seas.gwu.edu/) for additional information.

ADMISSIONS

Admission deadlines:	Fall - January 15
	Spring - September 1
	Summer - March 1 (non-F1 visa seeking applicants)
Standardized test scores:	The GRE General Test is optional for all applicants. For applicants who want to submit scores, they must be submitted officially from ETS using the institutional code 5246.
	The Test of English as a Foreign Language (TOEFL), the Academic International English Language Testing System (IELTS), or the PTE Academic is required of all applicants except those who hold a bachelor's, master's, or doctoral degree from a college or university in the United States or from an institution located in a country in which English is the official language, provided English was the language of instruction. Minimum scores:
	- Academic IELTS: an overall band score of 6.0 with no individual score below 5.0; applicants requesting funding consideration must have an overall band score of 7.0 with no individual score below 6.0; or
	- TOEFL: 550 on paper-based or 80 on Internet-based; applicants requesting funding consideration must have 600 on paper-based; or 100 on Internet-based; or
	- PTE Academic: 53; applicants requesting funding consideration must have 68.
Recommendations required:	Three (3) recommendations required.
Prior academic records:	Transcripts are required from all colleges and universities attended, whether or not credit was earned, the program was completed, or the credit appears as transfer credit on another transcript. Unofficial transcripts from all colleges and universities attended must be uploaded to your online application. Official transcripts are required only of applicants who are offered admission.
	If academic records are in a language other than English, a copy in the original language and an English language translation must be uploaded. Transcript evaluations should not be uploaded. Applicants who have earned a degree from an Indian university are required to submit individual semester marksheets.
Statement of purpose:	In an essay of 250 to 500 words, state your purpose in undertaking graduate study at The George Washington University; describe your academic objectives, research interests, and career plans; and discuss your related qualifications, including collegiate, professional, and community activities, and any other substantial accomplishments not already mentioned.
Additional requirements:	Applicants must possess a bachelor's or master's degree in an appropriate area from an accredited institution. Applicants must also show evidence of a strong academic or relevant professional background pertinent to the field of study and must demonstrate a capacity for original scholarship. Students whose highest degree is a bachelor's must have a grade point average of at least 3.4 (on a scale of 4.0).
	All applicants must choose an area of focus that most closely matches their interests and note this on the online application. All applicants must submit a resumé or CV.
International applicants only:	Please follow this link - https://graduate.admissions.gwu.edu/international-student-application-requirements (https://graduate.admissions.gwu.edu/international-student-application-requirements/) - to review the International Applicant Information carefully for details on required documents, earlier deadlines for applicants requiring an I-20 or DS-2019 from GW, and English language requirements.

For additional information about the admissions process visit the SEAS Admissions Frequently Asked Questions (https://

graduate.engineering.gwu.edu/admissions-frequently-asked-questions/) page.

Contact for questions:

engineering@gwu.edu
202-994-1802 (phone)
202-994-1651 (fax)

Hours: 9:00 am to 5:00 pm, Monday through Friday

REQUIREMENTS

The following requirements must be fulfilled:

The general requirements stated under School of Engineering, Doctoral Program Regulations (http://bulletin.gwu.edu/engineering-applied-science/#Doctor_of_Philosophy).

Credit Requirements

Students with an master of science (MS) degree take a minimum of 30 credits, at least 18 of which must be in courses available for graduate credit and at least 12 of which must be in dissertation research. Course selections must be approved by the student's advisor.

Students with a bachelor of science (BS) degree, take a minimum of 54 credits, at least 36 of which must be from courses available for graduate credit, and at least 12 must be in dissertation research. The remaining 6 credits can be in undergraduate courses available for graduate credit, graduate courses, dissertation research credits, or a combination of all. Course selections must be approved by the student's advisor.

No more than 6 credits of independent research (BME 6050) can be applied toward the degree.

Preliminary/Qualifying Examinations

Students in the PhD in biomedical engineering must take a doctoral preliminary examination, which is held at the beginning of each semester. The goal of the examination is to determine the student's aptitude and ability to complete original and independent research at the doctoral level, to assess the student's ability to review previous work from the literature, and to determine the student's ability to understand and apply fundamental concepts in their technical area. A written proposal and an oral presentation of the predetermined question are required. All students should take the exam as early as possible after they complete at least 6 credits in core courses and 6 credits in elective courses and maintain a minimum average GPA of 3.4. The examination typically should be completed no later than the beginning of a student's fourth semester.

Dissertation

After successful completion of the preliminary examination the student is admitted to candidacy and begins specialized research under the supervision of the dissertation advisor. Research direction can be shared by a full-time faculty member and an outstanding external scientist or engineer, but the final responsibility for the academic aspects of the dissertation work lies with the BME faculty advisor.

Dissertation research proposal

During the research phase, each doctoral candidate must give a research proposal presentation to the dissertation committee. The student's research progress is assessed by the committee and appropriate suggestions for continuing research directions are solicited from those in attendance. Scheduling of the research proposal presentation will be done at a minimum of one year before the final dissertation defense by the student's dissertation advisor. The committee helps the student to define the research topic, and ultimately approves the research proposal. The dissertation advisor should propose the membership of the dissertation research committee, which must be approved by the associate chair for research and graduate affairs. At least four individuals should serve on the research proposal committee; the research advisor is the dissertation director (also called the advocate) and three others. Two of the committee members must be full-time BME faculty. Students are required to present the written dissertation proposal to the committee and to successfully defend the proposal in an oral defense after performing the bulk of their dissertation research. After the proposal defense, the student submits the revised proposal, complying with all suggestions, clarifications, and corrections, as required by the dissertation committee.

Dissertation defense

The dissertation advisor can decide that the research achieved by the doctoral student is sufficient to satisfy the requirement of the degree. The advisor proposes an examining committee for the purpose of administering the final dissertation examination—the dissertation defense. The committee of examiners must consist of at least five members, at least three of whom normally are full-time BME faculty members with scholarly specialties within the area of concentration; at least one member normally is from an academic specialty outside the area of concentration. An external examiner must be invited. The dissertation advisor serves on the examining committee both as advocate and as a non-voting committee member. As its first order of business, the committee elects its own chairman, who should not be the dissertation advisor or the student's faculty advisor. The dissertation examining committee must be approved by the associate chair for research and graduate affairs prior to the date of the defense. Each member of the examination committee, no later than three weeks prior to the defense, should receive a copy of the dissertation document. At the same time, the candidate must provide a 350-word abstract and other information to the department for the purpose of preparing an announcement of the defense. The dissertation defense is an oral examination, which is open to the public. When the dissertation is accepted as complete, it should be submitted electronically no later than the date specified by the Office of the Registrar.

Publication Requirements

Before the doctoral defense, the PhD student must publish at least one first-author manuscript in a peer-reviewed journal on original work related to the topic of the doctoral dissertation.

Graduation and Scholarship Requirements

Students are responsible for adhering to the university's minimum GPA requirement for graduation and scholarships. Consult SEAS Regulations (http://bulletin.gwu.edu/engineering-applied-science/#seasregulationstext) section of this Bulletin. Students should contact the department for additional information and requirements.