Erik Jonsson School of Engineering & Computer Science

Department of Bioengineering

Objectives

The master's (MS) and doctoral (PhD) programs in Biomedical Engineering at UT Dallas are offered as a part of a unique tri-campus program, encompassing UT Southwestern Medical Center and UT Arlington. The objective of the PhD Program in Biomedical Engineering (BMEN) is to train the next generation of leaders in the field through high-quality original research work, supplemented as appropriate by a broad range of interdisciplinary courses.

The new generation of biomedical engineers will address fundamental scientific questions, provide answers to critical problems, and develop novel applications with commercial potential. The opportunities for interdisciplinary research and coursework in several branches of engineering, coupled with the life sciences, will prepare the graduates of this program to address complex life sciences-related problems in novel ways and to create vital solutions for the future.

The objective of the MS degree program in Biomedical Engineering is to generate BMEN graduates who will be capable of undertaking challenging BMEN-related projects. The primary educational objective of the MS program is to expose students to the latest developments in biomedicine and to provide them with the appropriate tools to understand and contribute further to these developments. The MS degree program will provide the necessary education and immediately applicable skills that will enable both recent baccalaureate graduates and experienced biomedical engineers to develop new life science related technologies and applications.

Facilities

The Engineering and Computer Science Building and the new Natural Science and Engineering Research Laboratory provide extensive wet lab, fabrication, instrumentation, and high performance computing facilities to foster biomedical engineering and nano-technology research. A Class 10000 microelectronics clean room facility, including e-beam lithography, sputter deposition, PECVD, LPCVD, etch, ash and evaporation, is available for student projects and research. In addition to the facilities on campus, students in this program will also have an opportunity to work closely with researchers in the UT Southwestern Medical Center and UT Arlington.

Master of Science in Biomedical Engineering

33 semester credit hours minimum
Department Faculty

**Professors:** Orlando Auciello, Stuart Cogan, Stephen D. Levene, Joseph Pancrazio, Shalini Prasad, Robert L. Rennaker II, David Schmidtke

**Clinical Professor:** Diana Easton

**Associate Professors:** Leonidas Bleris, Kenneth Hoyt, Mario Romero-Ortega, Mihaela C. Stefan

**Assistant Professors:** Robert D. Gregg, Heather Hayenga, Seth Hays, Hyun-Joo Nam, Danieli Rodrigues, Shashank Sirsi, Victor Varner, Jun Wang, Taylor Ware, nxf160330

**Senior Lecturers:** Tariq Ali, Soudeh Ardestani Khoubrouy, Allison Case, Steven Foland, Kathleen Mcneeley, Clark A. Meyer, Joe Pacheco, Todd W. Polk, Patrick Winter

**UT Dallas Affiliated Faculty:** John Hart Jr., Michael P. Kilgard, Ann Majewicz, Faruck Morcos, Issa M. S. Panahi, Balakrishnan Prabhakaran, A. Dean Sherry, Mathukumalli Vidyasagar, Michael Qiwei Zhang

**Adjunct Faculty:** Jonathan Cheng, Fan Gao, Wayne Gluf, Lan Ma, Albert Montillo, Anjan Panneer Selvam, Benjamin Porter, Zhenpeng Qin, Jennifer Seifert

Admission Requirements

The University's general admission requirements are discussed on the [Graduate Admission page](catalog.utdallas.edu/2016/graduate/admission). A student lacking undergraduate prerequisites for graduate courses in Biomedical Engineering (BMEN) must complete these prerequisites or receive approval from the graduate advisor and the course instructor.

The student entering the MS BMEN program should meet the following qualification guidelines:

- Undergraduate preparation equivalent to a baccalaureate in a field of engineering or the sciences
- A grade point average (GPA) in upper-division quantitative coursework of 3.33 or better on a 4.0 point scale
- GRE revised scale scores of 154, 156, and 4 for the verbal, quantitative, and analytical writing components, respectively, are advisable based on our experience with student success in the program. These verbal (V) and quantitative (Q) scores are equivalent to 520 (V) and 720 (Q) on ETS's prior GRE scale.
- See also UT Dallas requirements for [English proficiency](catalog.utdallas.edu/2016/graduate/programs/ecs/biomedical-engineering).

Applicants must submit an essay or "Statement of Purpose" outlining their background, education, and professional goals. Additionally, three letters of recommendation from individuals who are able to judge the candidate's probability of success in pursuing the program of study leading to the master's degree are required. Letters may be submitted by recommenders on official school or
business letterhead in sealed envelopes or by using the electronic UT Dallas Letter of Recommendation Form available on the UT Dallas Graduate Application for Admission.

Degree Requirements

The University's general degree requirements are discussed on the Graduate Policies and Procedures page (catalog.utdallas.edu/2016/graduate/policies/policy).

The MS BMEN requires the completion of a minimum of 33 semester credit hours. A minimum of 33 semester credit hours must consist of BMEN or BMEN cross-listed courses, 12 semester credit hours of which must come from the following BMEN core courses.

- **BMEN 6351** Biomedical Microdevices
- **BMEN 6355 (MSEN 6355)** Nanotechnology and Sensors
- **BMEN 6373 (EEBM 6373)** Anatomy and Human Physiology for Engineers
- **BMEN 6374 (EEBM 6374)** Genes, Proteins and Cell Biology for Engineers
- **BMEN 6375** Techniques in Cell and Molecular Biology
- **BMEN 6386** Biological Processes: Modeling and Simulation
- **BMEN 6387 (BIOL 5376)** Applied Bioinformatics
- **BMEN 6333** Quality Management Systems and Compliance
- **BMEN 6331** Regulation of Medical Devices & Diagnostics
- **BMEN 6332** The Legal Business of Medical Devices

The requirement for the remaining 9 semester credit hours the beyond the 24 semester credit hours of BMEN or BMEN cross-listed courses can be satisfied by completing recommended electives. These credits can be selected from 6000-level courses offered by the Erik Jonsson School of Engineering and Computer Science, the Department of Biological Sciences in the School of Natural Sciences and Mathematics, or appropriate courses taught at UT Southwestern or UT Arlington.

The MS BMEN program offers both thesis and non-thesis options. All MS BMEN students will be assigned initially to the non-thesis option. Those students who elect the thesis option may do so by obtaining the approval of a faculty thesis supervisor. Research and thesis semester credit hours cannot be counted in an MS BMEN degree plan unless a thesis is written and successfully defended.

- In order to satisfy degree requirements, students must achieve an overall GPA of 3.00 or better.
- Students must obtain a GPA of 3.33 or better in all MS BMEN or BMEN cross-listed courses.
- To be considered for admission to the PhD program, one must obtain an overall graduate GPA of 3.33.

All full-time, supported students are required to participate in the thesis option. These students must have an academic advisor and an approved degree plan.
• **BMEN 7188**: Advanced seminar series is mandatory for all PhD students and M.S. students (Exceptions on **BMEN 7188**: Student need not take **BMEN 7188** in the graduating semester, student taking an equivalent class at either UT Southwestern or UT Arlington can be exempt from taking **BMEN 7188** in that semester **BMEN 7387**: Independent Scientific Research in Bioengineering is required at least once in the PhD study plan. Student becomes eligible to take **BMEN 7387** the semester after passing the written and oral QE)

# Doctor of Philosophy in Biomedical Engineering

*75 semester credit hours minimum beyond the baccalaureate degree*

## Department Faculty

**Professors**: Orlando Auciello, Stuart Cogan, Stephen D. Levene, Joseph Pancrazio, Shalini Prasad, Robert L. Rennaker II, David Schmidtke

**Clinical Professor**: Diana Easton

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**Adjunct Faculty**: Jonathan Cheng, Fan Gao, Wayne Gluf, Lan Ma, Albert Montillo, Anjan Panneer Selvam, Benjamin Porter, Zhenpeng Qin, Jennifer Seifert

## Admission Requirements

The University's general admission requirements are discussed on the [Graduate Admission](https://catalog.utdallas.edu/2016/graduate/admission) page.

The PhD in Biomedical Engineering (BMEN) is awarded primarily to acknowledge the student's success in an original research project, the description of which is a significant contribution to the literature of the discipline. Applicants for the doctoral program are therefore selected by the Biomedical Engineering Program Graduate Committee on the basis of research aptitude, as well as academic record. Applications for the doctoral program are considered on an individual basis.

The following are guidelines for admission to the PhD program in Biomedical Engineering:

• Bachelor's or master's degree in engineering or one of the natural sciences.

• A grade point average in graduate coursework of 3.33 or better on a 4.0 point scale.
• Students admitted to the program without a master's degree are required to take a minimum of 33 semester credit hours of organized coursework. A minimum of 24 semester credit hours must consist of BMEN or BMEN cross-listed courses.

• An overall grade point average of 3.33 or better on a 4.0 point scale for students entering without a master's degree.

• GRE revised scale scores of 154, 156, and 4 for the verbal, quantitative, and analytical writing components, respectively, are advisable based on our experience with student success in the program. These verbal (V) and quantitative (Q) scores are equivalent to 520 (V) and 720 (Q) on ETS's prior GRE scale.

• See also UT Dallas requirements for English proficiency.

Applicants must submit an essay or Statement of Purpose describing motivation for doctoral study and how it relates to their professional goals, area of research interest, and potential supervising professor. Students are encouraged to directly contact faculty about research opportunities and their willingness to serve as their supervising professor.

Three letters of recommendation from individuals who are familiar with the student's record and are able to competently judge the candidate's probability of success in pursuing doctoral study in biomedical engineering are required. Letters may be submitted by recommenders on official school or business letterhead in sealed envelopes or by using the electronic UT Dallas Letter of Recommendation Form available on the UT Dallas Graduate Application for Admission.

For students who are interested in a PhD but are unable to attend school full-time, there is a part-time option. The guidelines for admission to the program and the degree requirements are the same as for full-time PhD students.

All students must have a supervising professor and an approved plan of study.

Degree Requirements

The University's general degree requirements are discussed on the Graduate Policies and Procedures page (catalog.utdallas.edu/2016/graduate/policies/policy).

Each program for doctoral study is individually tailored to the student's background and research objectives by the student's dissertation committee.

The PhD degree requires a minimum of 75 semester credit hours beyond the baccalaureate degree.

1. All students entering the PhD program with a master's degree must complete a minimum of 9 semester credit hours of BMEN or BMEN cross-listed graduate-level course work with a 3.33 GPA or higher. The courses will be selected in consultation with the supervising professor.

2. Students admitted to the program without a master's degree are required to complete a minimum of 33 semester credit hours of organized coursework. A minimum of 33 semester credit hours must consist of BMEN or BMEN cross-listed courses with a 3.33 GPA or higher. The courses will be selected in consultation with the supervising professor.
3. Students are required to have a supervising professor upon entry to the PhD program and develop an approved plan of study during the first long semester.

4. It is expected that candidates will form a dissertation committee following successful completion of the qualifying exam. The candidates should schedule a meeting with their dissertation committee once per long semester until they graduate from the program.

5. The dissertation committee or supervising professor can require additional courses.

Also required are:

- A qualifying examination (QE), consisting of a written exam and an oral defense demonstrating competence in the PhD candidate's research area. Admission to PhD candidacy is based on two criteria: graded performance in the QE and GPA in graduate-level organized courses. All students entering the PhD program must pass the QE within 2 long semesters. A student has at most two attempts to pass the QE which is given once during each fall and spring semesters.

- After successful completion of the qualifying exam, the student is required to officially form the Dissertation Committee. The Dissertation Committee must be formally approved by the department head and the Office of the Dean of Graduate Studies.

- After the student's Dissertation Committee is formally approved, the student submits a written dissertation proposal to the Dissertation Committee. After the proposal is approved by the Dissertation Committee, the student will defend the dissertation proposal. A student has at most two attempts to successfully complete the dissertation proposal defense.

- Completion of a major research project culminating in a dissertation, demonstrating an original contribution to scientific knowledge and engineering practice. The dissertation will be defended publicly. The rules for this defense are specified by the Office of Graduate Studies. Neither a foreign language nor a minor is required for the PhD. However, the student's Dissertation Committee may impose these or other requirements that it feels are necessary and appropriate to the student's degree program.

- **BMEN 7188** Advanced seminar series is mandatory for all PhD students and M.S. students (Exceptions on **BMEN 7188**: Student need not take **BMEN 7188** in the graduating semester, student taking an equivalent class at either UT Southwestern or UT Arlington can be exempt from taking **BMEN 7188** in that semester **BMEN 7387**: Independent Scientific Research in Bioengineering is required at least once in the PhD study plan. Student becomes eligible to take **BMEN 7387** the semester after passing the written and oral QE)