BIOMEDICAL ENGINEERING, PHD

Department Chair

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Faculty

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The Department of Biomedical and Chemical Engineering offers a comprehensive set of graduate programs in biomedical and chemical engineering, including Master's of Science (MS) degrees and Doctor of Philosophy (PhD) degrees. Graduates of these programs work in the medical profession, the biomechanics and bioinstrumentation industries, the chemical engineering industry, the government, and in education.

The graduate program in biomedical engineering provides a wide range of opportunities for advanced study in this interdisciplinary field. This graduate program is linked with and focused on research programs in biomaterials and tissue engineering; biomechanics; orthopedic biomechanics; cardiac bioengineering; and neural engineering. Which degree to consider depends on one's career goals.

Major research laboratories include the Syracuse Biomaterials Institute, the Institute for Human Performance, and laboratories at nearby SUNY Upstate Medical University. Strong collaboration between Upstate Medical University and Syracuse University faculty, students, and staff provides opportunities for bioengineering research in clinical and basic science departments at Upstate, as well as in-depth study at one of the Syracuse University bioengineering research centers.

Current Research Areas

- Biomaterials &Tissue Engineering
- Catalysis & Reaction Engineering
- Complex Fluids, Soft Matter & Rheology
- Corrosion and Electrochemistry
- Drug Delivery
- Molecular Biotechnology
- Multiscale Modeling and Simulation
- Nanotechnology
- Sustainable Energy Production
- Systems Biology/Metabolic Engineering

Student Learning Outcomes

1. Define research objectives
2. Choose and use appropriate research methods to achieve the defined objectives
3. Use appropriate methods to analyze research data and interpret the findings
4. Effectively communicate the work to its intended audiences
5. Critically analyze his or her own research work and existing scholarship in the field

PhD in Biomedical Engineering

The Doctor of Philosophy (PhD) is a research-based degree program involving a high level of training in advanced biomedical engineering. A dissertation consisting of original research in a specialty area within the bioengineering program is required. A minimum of 42 credit hours is required for the completion of the PhD degree. No dissertation credits are required. A student entering the PhD program with an MS degree may apply up to 30 credits toward the required coursework, with the approval of the program director.

Residency

A minimum of three years of graduate study is required and students typically complete all requirements within five years.

Coursework Requirements (42 Credits)

Students must complete no fewer than 42 credits of coursework, including:

- BEN 602 Ethical Issues in Engineering and Research 3 credit(s)
  15 credits of additional Bioengineering (BEN) coursework; and
  24 credits of approved electives.

General Requirements

Minimum GPA

All graduate students must achieve the following minimum grade point averages (GPA):

- 3.000 GPA for all credits counted toward the completion of coursework requirements; and
- 2.800 GPA cumulative for all credits earned at Syracuse University.

Maximum Credits of 500-Level Coursework

Graduate students in the PhD program may not count more than 14 credits of 500-level coursework toward the completion of their PhD program of study.

Maximum Credits of Research-Based Study

Graduate students in the PhD program may count up to 6 credits of research-based study toward the completion of their PhD program of study from any combination of:

- BEN 999 Dissertation under supervision of their dissertation advisor;
- BEN 690 Independent Study not supervised by their dissertation advisor;
- BEN 991 Introduction to MS Research and BEN 997 Masters Thesis transferred from the MS program.

Exit Requirements

Qualifying Examination

All PhD students must successfully complete a Qualifying Examination in order to be entered into doctoral candidacy.

The Qualifying Examination has two components; a written outline of the student's research and an oral presentation before the examination committee.

Timing

Students are expected outline and present their research to a faculty examination committee by the end of their third semester of study.

Organization of Outline

The written outline will consist of two parts; a concise summary of the student's research since entering the program (the Research Update), and a description of future plans for the duration of PhD study based on the current research topic (the Research Plan).

The Research Update should include sections for Introduction, Methods, Results, Discussion, and Conclusion. The Research plan should include sections for Significance, Rationale, Proposed Research, and Potential Pitfalls.

The document should be from the student's own writing but students are encouraged to consult with their advisor on how to best summarize research results and design future studies.

Document Length

The outline should be no more than ten pages, all included, plus a cover page.

Examination Committee

The examination committee will consist of the dissertation advisor and at least three tenured or tenure-track faculty members. All faculty are invited to participate.

Dissertation

The Oral Dissertation Defense and submission of the dissertation document to the Syracuse University Graduate School are the final requirements of the PhD program.

Defense paperwork must comply with Graduate School policy, including formatting.

Link to the Graduate School's guidelines (http://graduateschool.syr.edu/policies-and-requirements/graduation-requirements/)

Preparation

It is recommended that the student meet with their defense committee to review dissertation progress at least three to six months in advance of the defense.

Deadlines

The official Request for Examination form must be signed and submitted to the Graduate School at least **three full weeks** prior to the oral defense date.

A copy of the dissertation document must be delivered to all members of the defense committee at least **two full weeks** prior to the oral defense date.

Defense Committee

The dissertation defense committee will consist of six members, including

- the research advisor;
- four tenured or tenure-track faculty members from the department; and
- the Chair of the Oral Examination Committee.

The Chair of the Oral Examination Committee must be a Syracuse University tenured or tenure-track faculty member from outside the department and program.

The student may substitute one committee member based on subject-matter expertise who is external to Syracuse University. Additional external committee members may be allowed by petition.