

Biomedical Engineering

The Joint Department of Biomedical Engineering Graduate Program is administered by the combined biomedical engineering graduate faculty from both North Carolina State University and University of North Carolina at Chapel Hill. The joint program also has close working relations with the Research Triangle Institute and industry within the Research Triangle area. These associations enable students to obtain research training in a wide variety of fields and facilitate the selection and performance of dissertation research. Thus, the department, thus, provides students with excellent opportunities to realize the goal of enhancing medical care through the application of modern technology.

Biomedical engineering is a dynamic field stressing the application of engineering techniques and mathematical analysis to biomedical problems. Faculty research programs are key to the program, and they include five primary research directions: rehabilitation engineering, regenerative medicine, biomedical imaging, biomedical microdevices, and pharmacoengineering. The department offers graduate education in biomedical engineering leading to the master of science (MS) and doctor of philosophy (PhD) degrees.

Students typically enter this program with backgrounds in engineering, physical science, mathematics or biological science. Curricula are tailored to fit the needs and develop the potential of individual students. In addition, courses in statistics, mathematics, life sciences and engineering provide a well-rounded background of knowledge and skills.

Doctoral Degree Requirements

A minimum of 52 semester hours of graduate work is required (beyond the Bachelor's degree). Degree candidates in this program are expected to obtain experience working in a research laboratory and to demonstrate proficiency in research. The PhD dissertation should be judged by the graduate committee to be of publishable quality. The student must meet the Graduate School's residency requirement at UNC-CH or NC State as appropriate. Further information on the BME PhD program can be found on the department website.

Required and Highly Recommended Courses

Students must complete six credits of graduate engineering topics, six credits of graduate life science topics, three credits of engineering mathematics, and three credits of statistics. Nine credits of technical electives are also required. Students may choose from a number of courses to meet these requirements. Such choices are made in consultation with the student's academic advisor and the Director of Graduate Programs/Studies.

Students are required to take a BME Seminar each semester which is offered at both UNC-CH and NC State. Students must also complete a Mentored Teaching Experience and a Professional Development Seminar.

Comprehensive and Qualifying Examinations

Doctoral students qualify for the PhD degree by meeting grade requirements in their core courses, completing qualifying exams in their first year, and then advancing on to written and oral preliminary exams

before admission to candidacy. Details can be found on the department website.

Biomedical Engineering Program Website (<https://bme.unc.edu/graduate/why-choose-bme/>)

Admission Requirements

Students must satisfy all entrance requirements for The Graduate School of the University of North Carolina at Chapel Hill or the Graduate School at North Carolina State University, and must demonstrate interest and capability commensurate with the quality of the biomedical engineering program. Prospective students may apply to the graduate school through either UNC-Chapel Hill or NC State. All applicants are considered together as a group. Generally, applications should be submitted by the second Tuesday of December for consideration for admission in the coming fall semester. Students are no longer required to submit their GRE scores. Admitted students are expected to maintain an overall GPA of at least 3.00 and are encouraged to have undergraduate research experience. The program requires that a personal statement (1-3 pages) about research interest and background be submitted.

Students should have a good working knowledge of mathematics at least through differential equations, plus two years of physical science or engineering and basic courses in biological science. Deficiencies in preparation can be made up in the first year of graduate training.

Applicant Information

For the 2024-2025 academic year, the Biomedical Engineering department is not accepting applications for the Biomedical Engineering (MS): Traditional Concentration (<https://catalog.ncsu.edu/graduate/engineering/biomedical-engineering/biomedical-engineering-ms-traditional-concentration/>). Students can apply to the Biomedical Engineering (MS): MedTech Innovation and Entrepreneurship Concentration (<https://catalog.ncsu.edu/graduate/engineering/biomedical-engineering/biomedical-engineering-ms-translation-innovation-entrepreneurship-concentration/>) or the Biomedical Engineering (PhD) (<https://catalog.ncsu.edu/graduate/engineering/biomedical-engineering/biomedical-engineering-phd/>).

- **Delivery Method:** On Campus
- **Entrance Exam:** None
- **Interview Required:** None

Degrees

- Biomedical Engineering (Minor) (<http://catalog.ncsu.edu/graduate/engineering/biomedical-engineering/biomedical-engineering-minor/>)
- Biomedical Engineering (MS) (<http://catalog.ncsu.edu/graduate/engineering/biomedical-engineering/biomedical-engineering-ms/>)
- Biomedical Engineering (MS): MedTech Innovation and Entrepreneurship Concentration (<http://catalog.ncsu.edu/graduate/engineering/biomedical-engineering/biomedical-engineering-ms-translation-innovation-entrepreneurship-concentration/>)
- Biomedical Engineering (MS): Traditional Concentration (<http://catalog.ncsu.edu/graduate/engineering/biomedical-engineering/biomedical-engineering-ms-traditional-concentration/>)
- Biomedical Engineering (PhD) (<http://catalog.ncsu.edu/graduate/engineering/biomedical-engineering/biomedical-engineering-phd/>)
- Nanobiotechnology (Certificate) (<http://catalog.ncsu.edu/graduate/engineering/biomedical-engineering/nanobiotechnology-certificate/>)

Faculty

Department Chair

Paul Dayton

Associate Chairs

Lianne Cartee, *Associate Chair for Education*

Shawn Gomez, *Associate Chair for Research*

Directors

Lianne Cartee, *Director of Undergraduate Studies*

Matthew Fisher, *Director of Graduate Studies*

Associate Director

Naji Husseini, *Associate Director of Undergraduate Studies*

Distinguished Professors

Lianne Cartee, *Alumni Distinguished Undergraduate Professor*

Paul Dayton, *William R. Kenan Jr. Distinguished Professor*

He (Helen) Huang, *Jackson Family Distinguished Professor*

H. Troy Nagle

Roger Narayan

Koji Sode, *William R. Kenan Jr. Distinguished Professor*

Professors

Lianne Cartee

Paul A. Dayton

Caterina M. Gallippi

Shawn Gomez

Leaf Huang

H. Troy Nagle Jr.

Weili Lin

J. Michael Ramsey

George (Rick) Stouffer

Associate Professors

Ashley Brown

Yevgeny Brudno

Jacqueline Cole

Michael Daniele

Bob Dennis

Kenneth Donnelly

Oleg Favorov

Matthew Fisher

Jason Franz

Donald Freytes

Michael Gamcsik

David Hill

Devin Hubbard

Naji Husseini

Derek Kamper

David Lalush

Jeffrey Macdonald

Scott Magness

Matthew Penny

Gianmarco Pinton

Nitin Sharma

Mark Tommerdahl

Anka Veleva

Bruce Wiggan

David Zaharoff

Assistant Professors

Amy Adkins

Pritha Agarwalla

Wen Yih Aw

Rahima Benhabbour

Joseph Burclaff

Melissa Caughey

Silvia Ceballos

Brian Diekman

Alon Greenbaum

Michael Jay

Kennita Johnson

Jinwook Kim

Wesley Legant

Ming Liu

Virginie Papadopoulou

Ross Petrella

William Polacheck

Imran Rizvi

Francisco Santibanez

Sarah Shelton

James Tsuruta

Lecturers

Sidhartha Jandhyala

Nick Jardine