Biomedical Engineering, M.S.Bm.E., Ph.D.

Degrees Offered

- Masters of Science in Biomedical Engineering (M.S.Bm.E.)
- Doctor of Philosophy, Biomedical Engineering (Ph.D.)

Nature of the Program

The focus of the graduate program will be to prepare students to be skilled in learning and discovering of processes that aim to integrate engineering and life sciences for the advancement of human health and medical technologies. Just as importantly, the program will build upon current collaborative efforts with local and regional clinicians, industry and academic leaders engaged in state-of-the-art biomedical engineering research. Lastly, the program will foster the production and application of new knowledge in areas that impacts the health and well-being of all West Virginia (WV) citizens, as well as contribute to the providing skilled local workers in biomedical engineering (BMEG), thus driving development of the WV’s economy in this exciting area.

Student Learning Outcomes

The learning outcomes of students graduating in BMEG will be defined and measured as follows:

1. Mastery of basic and advanced graduate level knowledge in their chosen areas of specialty as related to BMEG. This outcome will be measured through the grades that the students earn in their coursework;
2. Ability to complete on time specific research tasks. This outcome will be measured through the grade (Satisfactory, Incomplete, or Unsatisfactory) that the student receives every semester from his/her major research advisor for the appropriate research course (700 level);
3. Strong oral communication skills. This outcome will be measured through the quality and number of oral presentations and reports given by the student to his/her Advising and Examining Committee (AEC), at technical meetings or conferences, as well as meetings of his/her research team;
4. Strong communication skills in writing. This outcome will be measured through the quality and number of technical reports, articles or reviews that the student may write during his/her graduate studies. Additionally, the quality of student’s communication skills in writing will be measured through the dissertation;
5. Ability to work independently in a collaborative environment – This outcome will be measured through feedback solicited from the members of student’s AEC, his/her peers, as well as the length of time the student needs to complete his/her graduate studies.

Admissions

Students applying for admission to the graduate program in biomedical engineering (BMEG) must meet the general requirements of admission of the WVU graduate school. Admission is expected to be competitive and students will be selected on the basis of their scholastic preparation and intellectual capacity as demonstrated in the application. Further, in addition to the university requirements, the CBE department where the student is to be enrolled will request the following proofs as part of the application:

- Applicant has a bachelor's degree from a recognized 4-year university, in engineering, or engineering-related disciplines including life science, physical science, computer science, biological science, physics, chemistry, mathematics, or applied mathematics;
- Applicants have a minimum 3.0/4.0 grade point average overall, in the last 2 years of undergraduate study, and in their major field;
- General Graduate Record Examination (GRE);
- Strong quantitative skills and background in life sciences, as evidenced by coursework or research experience should be demonstrated;
- Transcripts from all the universities attended. Applicants are required to upload the academic records from each academic institution (undergraduate and/or graduate) attended. Official, original academic credentials that are issued in a language other than English must be accompanied by a certified English translation;
- International applicants must submit proof of English language proficiency;
- Three letters of recommendation;
- Student CV;
- Statement of purpose, as part of the online application; this should not be more than two pages. The Statement of purpose should describe the motivation for graduate study and how it relates to their professional goals, area of research interest, as well as the potential supervising professor (if identified). The student should also identify the primary areas of research interests and the most likely BMEG faculty member the applicant would like to work with. The applicant could also indicate up to 3 areas of research interests as appropriate from the research directions in the CBE and at WVU respectively. Students are encouraged to directly contact faculty about research opportunities and their willingness to serve as their supervising professor;
- Non-refundable fee.

MSBmE Major Code: 3008

PhD Major Code: 3007
For specific information on the following programs, please see the links to the right:

- Biomedical Engineering, M.S.Bm.E.

For specific information on the following programs, please see the links to the right:

- Biomedical Engineering, Ph.D.

**COURSES**

**BMEG 501. Principles and Applications of Biomedical Engineering. 3 Hours.**
PR: Consent. Introduction to the principles of biomedical engineering from cells to systems. Biomedical engineering concepts and applications as related to biomaterials, drug delivery, tissue engineering, biohybrid devices, bioinstrumentation, bioimaging, and other areas. Emphasis on critical thinking and development of original research ideas.

**BMEG 593. Special Topics. 1-6 Hours.**
A study of contemporary topics selected from recent developments in the field.

**BMEG 601. Numerical and Statistical Methods for Biomedical Engineering. 3 Hours.**
PR: Consent. Introduces analysis methods for research in biomedical engineering. Topics include numerical analysis, simulation of dynamic systems, statistical inference test and applications in clinical trials, time-series data analysis, machine learning, bioimaging, and acquiring physiological data. Through homework projects, relevant examples and extensive case studies, this course will equip students with the tools to conduct research in biomedical engineering.

**BMEG 602. Interfacial Phenomena in Living and Non-Living Systems. 3 Hours.**
PR: Consent. Introduces concepts related to the interfacial phenomena in living and non-living systems. Specific topics covered include the free energy of interface formation, intermolecular and surface forces, energetic processes, thermodynamics, statistical mechanics, and interfacial phenomena that emphasize the chemical natures of living and non-living systems.

**BMEG 697. Research. 1-9 Hours.**
PR: Consent. Research activities leading to thesis, problem report, research paper, equivalent scholarly project, or dissertation. (Grading may be S/U.).

**BMEG 797. Research. 1-9 Hours.**
PR: Consent. Research activities leading to thesis, problem report, research paper, or equivalent scholarly project, or a dissertation. (Grading may be S/U.).