Biomedical Engineering, Ph.D.

Curriculum in Doctor of Philosophy – Biomedical Engineering

A candidate for the Ph.D. degree with a major in biomedical engineering must comply with the rules and regulations as outlined in the WVU Graduate Catalog and the specific requirements of the Statler College and the Chemical and Biomedical Engineering Department.

Program Requirements

The doctor of philosophy degree with a major in biomedical engineering is administered through the college's interdisciplinary Ph.D. program. The research work for the doctoral dissertation must show a high degree of originality on the part of the student and must constitute an original contribution to the art and science of biomedical engineering.

All Ph.D. degree candidates are required to perform research and follow a planned program of study. The student's research advisor, in conjunction with the student's Advising and Examining Committee (AEC) will be responsible for determining the plan of study appropriate to the student's needs. The underlying principle of the planned program is to provide the students with the necessary support to complete their degree and prepare them for their career.

Curriculum Requirements (BS-PhD Pathway)

Code	Title	Hours
A minimum GPA of 3.0 is required in all courses		
A grade of C- or higher must be earned in all required courses		
Course Requirements		
BMEG 501	Principles and Applications of Biomedical Engineering	3
BMEG 601	Numerical and Statistical Methods for Biomedical Engineering	3
BMEG 602	Interfacial Phenomena in Living and Non-Living Systems	3
Electives: [+]		21
Any BIOM, BMEG, BMS, CCB, CCMD, CE, CHE, CHEM, CPE, CS, CTS, EDP, EE, EMGT, EXPH, IENG, IH&S, MAE, MATH, MINE, OEHS, PNGE, PHYS, PT, SAFM, SENG, or STAT courses 500-795, as approved by the student's AEC [*]		
Graduate Seminar [++]		
CHE 786	Professional Development Seminar for Chemical and Biomedical Engineering [+++]	
Research		24
BMEG 797	Research	
Examinations		
Plan of Study		
Qualifying Examination		
Candidacy Examination		
Final Examination		
Dissertation		
Total Hours		54

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All elective courses must be approved by the student's AEC.

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Full-time Students are required to take one Seminar course each semester

Curriculum Requirements (MS-PhD Pathway)

Code	Title	Hours
A minimum GPA of 3.0 is required in all courses		
A grade of C- or higher must be earned in all required courses		
Course Requirements		
Electives [*]		18
Any BIOM, BMEG, BMS, CCB, CCMD, CE, CHE, CHEM, CPE, CS, CTS, EDP, EE, EMGT, EXPH, IENG, IH&S, MAE, MATH, MINE, OEHS, PNGE, PHYS, PT, SAFM, SENG, or STAT courses 500-795, as approved by the student's AEC		
Seminar [**]		

CHE 786	Professional Development Seminar for Chemical and Biomedical Engineering	
Research		24
BMEG 797	Research	
Examinations		
Plan of Study		
Qualifying Examination		
Candidacy Examination		
Final Examination		
Dissertation		
Total Hours		42

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All elective courses must be approved by the student's AEC.

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Full-time Students are required to take one Seminar course each semester

Examinations

QUALIFYING EXAMINATION

All Ph.D. students must pass a Ph.D. qualifying examination. This examination is designed to assess the basic competency in BMEG-related fields and determine whether or not students have sufficient knowledge to undertake independent research. Students are required to pass such qualifying examination by the end of their 2nd semester of enrollment in the program; however, it is normally required that full-time students pass the qualifying examination no later than the end of the 3rd semester of enrollment.

Students who do not pass this examination on their initial attempt will be allowed a 2nd attempt which should be scheduled in the follow up semester. If they are not successful on their 2nd attempt, then they will be dismissed from the program.

CANDIDACY EXAMINATION

In order to be admitted to candidacy, the student must pass a candidacy exam, which is designed to evaluate student's overall ability to engage in high-level research. Admission to candidacy can be assessed by a dissertation proposal and/or additional examination. Within a maximum of one semester after passing the PhD qualifying examination or entering the Ph.D. program, whichever is later, a student should successfully defend his/her dissertation research proposal. This proposal is a written document which must be reviewed and accepted by their AEC and subsequently defended in an oral presentation; the proposed research work should show a high degree of originality in the field. A student who has successfully completed all coursework, passed the qualifying examination, and successfully defended the research proposal is defined as one who is a candidate for the Ph.D. degree in BMEG at WVU.

Doctoral candidates are allowed no more than 5 years to complete the remaining degree requirements after formal admission to candidacy. An extension of time can be obtained only by repeating the qualifying and candidacy examinations and meeting any other requirements specified by the student's advisory and examining committee.

FINAL EXAMINATION

At the completion of the dissertation research, candidates must prepare a dissertation and pass the final oral examination (defense) administered by their AEC. Candidates should be demonstrating an original contribution to scientific knowledge and engineering practice in BMEG. The defense examination is open to the public and, in order to evaluate critically the student's competency, may include testing on material in related fields, as deemed necessary by the AEC. In addition, since the Ph.D. degree is primarily a research degree that embodies the results of an original research proposal and represents a significant contribution to scientific literature, the student must submit a manuscript on this research to the AEC. The rules for this defense and the timing for the manuscript submission are specified by the Office of Graduate Studies at WVU and the Statler College; neither a foreign language nor a minor is required for the Ph.D.

Student Learning Outcomes

BIOMEDICAL ENGINEERING

The learning outcomes of students graduating in biomedical engineering (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.