

DOCTOR OF PHILOSOPHY IN BIOMEDICAL ENGINEERING

This degree is awarded in recognition of a high level of mastery in subject matter and a significant original research contribution in biomedical engineering. The Ph.D. recipient will be capable of a continuing effort toward the advancement of knowledge and achievement in research and other scholarly activities and may pursue a career in a medical, industrial, or academic environment.

A minimum of 72 credit hours is required for the Ph.D. in Biomedical Engineering. Students who have received an M.S. degree from another university may petition for transfer of up to 32 credit hours applicable toward the Ph.D. degree. Students must pass the Ph.D. qualifying examination within the first year of full-time Ph.D. studies. This is a written and oral examination intended to explore both the depth and breadth of the student's academic abilities. Within two and one-half years of matriculation, students will be required to defend their thesis research proposal (comprehensive examination). A written dissertation and oral defense are also required for receiving the doctoral degree. Dissertation format and deadlines are established by the Graduate College.

There are no specific courses that are required for the doctoral degree in biomedical engineering. However, a minimum of three courses in life science, three courses in mathematics, and six courses in biomedical engineering or other engineering-related courses are required. The specific courses selected to meet these requirements will depend on the entering qualifications of the student and the nature of the thesis research proposal. In general, the student's thesis committee will determine the specific course requirements necessary for graduation. Graduate students should consult with their advisers to plan their curriculum.

Curriculum

Requirement	Credits
Minimum Credits Required	72
Maximum 400-Level Credit	3
Maximum Transfer Credit	32

Code	Title	Credit Hours
Life Science Courses		(9-10)
Select a minimum of three courses from the following:		9-10
BIOL 403	Biochemistry	4
BIOL 414	Genetics Engineering Scientist	3
BIOL 426	Concepts of Cancer Biology	3
BIOL 430	Human Physiology	3
BIOL 445	Cell Biology	3
BIOL 512	Advanced Biochemistry	3
BIOL 515	Molecular Biology	3
BIOL 527	Immunology and Immunochemistry	3
BIOL 550	Bioinformatics	3
Mathematics Courses		(9)
Select a minimum of three courses from the following:		9
CHE 535	Applctn Math Cheml Engrg	3
CHE 536	Computational Techniques Engg	3
MATH 461	Fourier Sers&Boudary-Val Probs	3
MATH 476	Statistics	3
MATH 489	Partial Differential Equations	3
MATH 512	Partial Differential Equations	3
MATH 519	Complex Analysis	3
MATH 532	Linear Algebra	3
MATH 542	Stochastic Processes	3
MATH 546	Introduction to Time Series	3
MATH 555	Tensor Analysis	3
MATH 564	Applied Statistics	3
MATH 577	Computational Mathematics I	3
MATH 578	Computational Mathematics II	3
MATH 581	Finite Element Method	3
MMAE 501	Engineering Analysis I	3

MMAE 502	Engineering Analysis II	3
MMAE 503	Advncd Engineering Analysis	3
MMAE 517	Computational Fluid Dynamics	3
PHYS 501	Meth Theoretical Physics I	3
PHYS 502	Methods of Theoretical Phys II	3
Biomedical Engineering or Other Engineering-Related Courses		(11-20)
Select a minimum of six courses from the following:		11-20
BME 500	Intro to Biomedical Engrg	3
BME 501	Communication Skills in BME	3
BME 503	Math Statistics Neuroscience I	2
BME 504	Neurobiology	2
BME 505	Math Statistics Neurosci II	2
BME 506	Comp Neurosci II: Vision	3
BME 507	Cognitive Neuroscience	2
BME 508	Math & Stats: Neuroscience III	2
BME 509	Vertebrate Neural Systems	3
BME 518	Reaction Kinetics for BME	3
BME 521	Medical Imaging	3
BME 522	Math Methods in BME	3
BME 523	Cell Biomechanics	3
BME 524	Quant Aspects Cell/Tissue Engg	3
BME 530	Inverse Probl Biomed Imgng	3
BME 532	Medical Imgng Science	3
BME 533	Biostatistics	3
BME 535	Magnetic Resonance Imgng	3
BME 537	Intro to Molecular Imaging	3
BME 538	Neuroimaging	3
BME 540	Wave Phys&Appl Optcs for Imag	3
BME 542	Adv Concepts in Image Science	3
BME 543	Bioinstrumentation & Electronics	3
BME 551	Phycal Sgl Analys Ctl Thry I	2
BME 552	Ctrl Systms for BioMed Engrs	3
BME 553	Quantitative Physiology	3
BME 575	Nueromechanics of Hum Movmnt	3
BME 581	Fluid Dynmcs Biomed Engrgs	3
BME 582	Advnc Mass Trnsprt Biomed Engr	3
BME 585	Comput Modls of Hum Cardio Sys	3
BME 595	Seminar in Biomed Engrng	3
BME 597	Special Problems	1-6
CHE 555	Polymer Processing	3
CHE 575	Polymer Rheology	3
CHE 577	Bioprocess Engineering	3
CHE 582	Intfcl Clldl Phmna Applctn	3
CHE 583	Pharmaceutical Engineering	3
CHE 585	Drug Delivery	3
CS 480	Introduction to Artificial Int	3
CS 525	Advanced Database Organization	3
CS 580	Topics in Machine Learning	3
CS 583	Probabilistic Graphical Models	3
ECE 511	Analysis Random Signals	3
ECE 565	Compt Vision Image Processing	3
ECE 566	Statistical Pattern Rcgntn	3

ECE 567	Statistical Signal Processing	3
MMAE 510	Fundmntls of Fluid Mechanics	4
MMAE 512	Dynamics of Viscous Fluids	4
MMAE 517	Computational Fluid Dynamics	3
MMAE 579	Advanced Materials Processing	3
General Electives		(0-18)
Select 0-18 credit hours of electives from BME 400-799 to fulfill minimum total credits		0-18
Ph.D. Research		(24-36)
BME 691	Research and Thesis Ph.D.	24-36

Minimum degree credits required: 72