

MASTER OF SCIENCE IN BIOMEDICAL ENGINEERING

The overall objective of the Master of Science in Biomedical Engineering degree is to provide training relevant to professional employment in a BME-related field. A minimum total of 32 credit hours is required for this degree, of which at least 24 credit hours must come from coursework; six to eight credit hours of research are required. This degree requires completion of a written dissertation and a subsequent oral defense of it before an approved master's thesis examination committee.

Admission Criteria

Because the M.S. degree requires the time and frequently the resources of a faculty mentor to be available in order to adequately execute the research component of the degree, the BME department will admit candidates who not only have the credentials suitable for this degree but for which a department faculty member consents to serve as the candidate's research mentor.

MASTER OF SCIENCE IN BIOMEDICAL ENGINEERING

Requirement	Credits
Minimum Degree Credits	32
Maximum 400-Level Credit	12

Code	Title	Credit Hours
Required Courses		(11)
BME 500	Intro to Biomedical Engrg	2
BME 533	Biostatistics	3
or BME 433	BME Applications of Statistics	
or CHE 426	Statistical Tools Engineers	
or MATH 425	Statistical Methods	
BME 453	Quantitative Physiology	3
BME 553	Adv Quantitative Physiology	3
Choose 1 of the 3 following area of focus options: Medical Devices and Biomaterials, Biomedical Data Science and Modeling, or Thesis		

MEDICAL DEVICES AND BIOMATERIALS OPTION

Code	Title	Credit Hours
Medical Devices and Biomaterials Core		(12)
BME 525	Introduction to Medical Device	3
or BME 425	Med Dev/BIOMEMS/Microfluidics	
BME 526	Advanced Design	3
CHE 580	Biomaterials	3
IDX 542	Analysis + Synthesis in Design	3
Medical Devices and Biomaterials Electives		(9)
Three credits of 400- or 500-level Engineering, Math, Computer Science, or Life Sciences with Advisor Approval (Recommended to choose from Choose 2 list below) ¹		3
Choose 2 courses (6 credits) from the following list ³		6
BME 502	Intro to Reg Sci Engr	3
BME 516	Biotechnology for Engineers	3
BME 523	Cell Biomechanics	3
or BME 423	Cell Biomechanics	
BME 524	Quant Aspects Cell/Tissue Engg	3
or BME 424	Quant Aspects Cell/Tissue Engg	
BME 528	Engineering World Health	3
or BME 428	Engineering World Health	
BME 597	Special Problems	1-6
CHE 506	Entrepreneurship & IP Mgmt	3
CHE 538	Polymerization Reaction Engrg	3
CHE 555	Polymer Processing	3
CHE 577	Bioprocess Engineering	3
CHE 583	Pharmaceutical Engineering	3

CHE 585	Drug Delivery	3
MMAE 451	Finite Elmnt Methods in Engrg	3
PHYS 420	Bio-Nanotechnology	3

BIOMEDICAL DATA SCIENCE AND MODELING OPTION

Code	Title	Credit Hours
Biomedical Data Science and Modeling Core		(12)
BIOL 550	Bioinformatics	3
BME 522	Math Methods in BME	3
or BME 422	Math Methods for Boimdel Engrs	
or CHE 439	Numerical Data Analysis	
or CHE 535	Applctn Math Cheml Engrg	
BME 560	Methods in Biomedical Data Sci	3
ECE 566	Machine and Deep Learning	3
Biomedical Data Science and Modeling Electives		(9)
Three credits of 400- or 500-level Engineering, Math, Computer Science, or Life Sciences with Advisor Approval (Recommended to choose from Choose 2 list below) ¹		3
Choose 2 courses (6 credits) from the following list ³		6
BIOL 414	Genetics Engineering Scientist	3
BIOL 521	Population Genetics	3
BME 518	Reaction Kinetics for BME	3
or BME 418	Reaction Kinetics for BME	
BME 537	Intro to Molecular Imaging	3
or BME 437	Intro to Molecular Imaging	
BME 538	Neuroimaging	3
or BME 438	Neuroimaging	
BME 545	Quantitative Neural Function	3
or BME 445	Quantitative Neural Function	
BME 582	Advnc Mass Trnsprt Biomed Engr	3
or BME 482	Mass Trnsprt for Biomedl Engrs	
BME 597	Special Problems	1-6
CS 425	Database Organization	3
CS 522	Advanced Data Mining	3
CS 577	Deep Learning	3
CS 578	Interact/Trans Mach Learning	3
CS 584	Machine Learning	3
ECE 505	Applied Optimization Engrgs	3

THESIS OPTION

Code	Title	Credit Hours
Thesis Core		(9)
BME 501	Communication Skills in BME	1
BME 591	Research & Thesis MS Degree	8
Thesis Electives		(12)
Choose 2 courses (6 credits) of 400- or 500-level Engineering, Math, Computer Science, or Life Sciences with Advisor Approval ¹		6
Choose 6 credits of 400- or 500-level BME ²		6

Excluding 591 courses from all disciplines. Advisor approval required.

² **Biomedical Engineering Electives:**
6 Credits in BME 400:599 (Excluding BME 492, BME 503-510, BME 591, BME 594, and BME 597), ENGR 498, 595.

³ Alternative 400- or 500-level electives in Engineering, Math, Life Science or Computer Science can be considered with Advisor Approval

¹ **Life Science, Advanced Mathematics, Computer Science, or Engineering Courses:**

6 Credits in MATH 400:599, BIOL 400:599, CHEM 400:599, PHYS 400:599, BME 400:599 (excluding BME 492 and BME 597), CAE 400:599, CS 400:599, CHE 400:599, MMAE 400:599, ECE 400:599.