

DOCTOR OF PHILOSOPHY (PH.D.)

The M.S. and the Ph.D. in Biomedical Engineering are jointly offered between The University of Texas Health Science Center at San Antonio and The University of Texas at San Antonio (UTSA). The primary objective of this program is to broadly train students in the principles of biomedical engineering, so they are well prepared to participate in the development of new approaches for the diagnosis and treatment of human diseases.

As the program is multidisciplinary, the curriculum is designed to provide a synergistic combination of formal courses, seminars, teaching opportunities, interactions with clinicians, and individualized biomedical engineering research experiences in the laboratories of the biomedical engineering faculty. All students are required to take core courses in the areas of Biomaterials, Biomechanics, Bioelectronics/Imaging and Biology, Physiology, as well as Responsible Conduct of Research, and Experimental Design and Data Analysis. In addition to the basic core curriculum, students are required to take additional coursework in the area of specialization. Students have access to the bioengineering and biosciences laboratories at both The University of Texas Health Science Center at San Antonio and UTSA. This provides a unique opportunity to have learning experiences in medical, dental, bioscience, and engineering environments.

Biomedical Engineering Admissions Requirements

Admissions requirements include: a baccalaureate or master's degree in a natural science or engineering discipline, competitive academic history (minimum GPA of 3.0/4.0), references, optional Graduate Record Exam (GRE), Test of English as a Foreign Language (TOEFL) or International English Language Testing System (IELTS) [international applicants only], three letters of recommendation, a statement of applicant's research experience(s) and interest in graduate study in BME. A typical successful applicant will have completed one year of calculus-based/engineering Physics, Chemistry, Biology, and Mathematics (up to Differential Equations or Engineering Analysis I). Students deficient in one or more of these will be required to take selected courses as a condition of acceptance. All facets of each applicant are considered in the admission process. Application to this joint degree program is managed through a central application process through UTSA. All applicants are required to follow UTSA's admissions requirements, and the requirements of UT Health San Antonio (background checks, GRE scores, immunizations and international transcript review/translation/certification).

Students whose native language is not English must achieve a minimum score of:

- 79 on the Internet based version of the Test of English as a Foreign Language (TOEFL) exam,
- 550 on the Paper based version of the Test of English as a Foreign Language (TOEFL) exam, or
- 6.5 on the IELTS exam

Those who do not meet the minimum English proficiency scores may be considered for the graduate pathway.

Minimum scores are based on UTSA's minimum required scores for international applicants. English language proficiency requirements can

be viewed on UTSA graduate admissions site (<https://future.utsa.edu/graduate/admissions/>) or UTSA international admissions site (<https://future.utsa.edu/international/>).

The applicant's performance on a standardized test will be considered in addition to other criteria for admission or competitive scholarship awards and will not be used as the sole criterion for consideration of an applicant.

International applicants who have completed or will complete their degree prior to matriculation at an accredited U.S. institution may be exempted from the TOEFL/IELTS requirement.

Biomedical Engineering Degree Requirements

A minimum of 82.0 credit hours and a minimum overall GPA of 3.0 are required for the Ph.D. degree in Biomedical Engineering. Undergraduate courses, general education courses, and prerequisites for graduate courses cannot be counted toward this total. For students with a master's degree, course credit allowed for transfer will be decided on a case-by-case basis by the Biomedical Engineering COGS. If recommended by the COGS, the request will then be submitted to the Dean of the Graduate School for approval. In addition, all doctoral candidates must register for the Dissertation course (BME 7099) for at least two semesters in order to graduate; only one of the terms may be a summer session. The student is required to demonstrate intellectual command of the subject area of the graduate program and capability to carry out independent and original investigation in the area. The student must successfully defend a dissertation and be recommended by their program COGS for approval of their degree to the Dean of the Graduate School of Biomedical Sciences.

Biomedical Engineering Plan of Study

* Please note that courses with the prefix BME are taken at The University of Texas at San Antonio.

First Year		
Fall		Credit Hours
BIME 6004	Biology For Bioengineers	3
BIME 6090	Seminar	1
RADI 5015	Physics Of Diagnostic Imaging 1	3
BME 6903		3
Total Credit Hours:		10.0
First Year		
Spring		Credit Hours
BIME 6090	Seminar	1
BIME 6006	Human Physiology for Bioengineers	3
TSCI 5070	Responsible Conduct of Research	2
BME 6803		3
Free or Prescribed Elective(s)		varies
Total Credit Hours:		9.0

First Year			Free or	varies
Summer		Credit Hours	Prescribed Elective(s)	
CSAT 5022	Inter-professional Human Gross Anatomy	5.5		
Total Credit Hours:		5.5	Total Credit Hours:	3.0-25.0
Second Year			Third Year	
Fall		Credit Hours	Spring	Credit Hours
BIME 6090	Seminar	1	BIME 7099, Dissertation	1-12
CSAT 5095	Experimental Design And Data Analysis	3	BME 7991, BME 7992, BME 7993, or BME 7996	
BME 6033		3	BIME 6097, Research	1-12
Free or Prescribed Elective(s)		varies	BME 7951, BME 7952, BME 7953, or BME 7956	
Total Credit Hours:		7.0	BIME 6090 or Seminar BME 6011	1
Second Year			Total Credit Hours:	3.0-25.0
Spring		Credit Hours	Third Year	
BIME 6097, Research		1-12	Summer	Credit Hours
BME 7951, BME 7952, BME 7953, or BME 7956			BIME 6097, Research	1-12
BIME 6090 or Seminar BME 6011		1	BME 7951, BME 7952, BME 7953, or BME 7956	
Free or Prescribed Elective(s)		varies	BIME 7099, Dissertation	1-12
Total Credit Hours:		2.0-13.0	BME 7991, BME 7992, BME 7993, or BME 7996	
Second Year			Total Credit Hours:	2.0-24.0
Summer		Credit Hours	Fourth Year	
BIME 6097, Research		1-12	Fall	Credit Hours
BME 7951, BME 7952, BME 7953, or BME 7956			BIME 7099, Dissertation	1-12
Total Credit Hours:		1.0-12.0	BME 7991, BME 7992, BME 7993, or BME 7996	
Third Year			BIME 6097, Research	1-12
Fall		Credit Hours	BME 7951, BME 7952, BME 7953, or BME 7956	
BIME 7099, Dissertation		1-12	BIME 6071 or Supervised Teaching ¹	1
BME 7991, BME 7992, BME 7993, or BME 7996			BIME 6021	
BIME 6097, Research		1-12	BIME 6090 or Seminar BME 6011	1
BME 7951, BME 7952, BME 7953, or BME 7956			Total Credit Hours:	4.0-26.0
BIME 6090 or Seminar BME 6011		1		

Fourth Year			Fifth Year		
Spring		Credit Hours	Spring		Credit Hours
BIME 6097, Research		1-12	BIME 7099, Dissertation		1-12
BME 7951,			BME 7991,		
BME 7952,			BME 7992,		
BME 7953, or			BME 7993, or		
BME 7956			BME 7996		
BIME 6071 or Supervised Teaching ¹		1	BIME 6097, Research		1-12
BME 6021			BME 7951,		
BIME 6090 or Seminar		1	BME 7952,		
BME 6021			BME 7953, or		
BIME 7099, Dissertation		1-12	BME 7956		
BME 7991,			BIME 6090 or Seminar		1
BME 7992,			BME 6011		
BME 7993, or			Total Credit Hours:		3.0-25.0
BME 7996					
Total Credit Hours:		4.0-26.0	Fifth Year		

Fourth Year			Summer		Credit Hours
Summer			Credit Hours		
BIME 6097, Research		1-12	BIME 7099, BME 7991, BME 7992, BME 7993, or BME 7996	Dissertation	1-12
BME 7951, BME 7952, BME 7953, or BME 7956			BIME 6097, BME 7951, BME 7952, BME 7953, or BME 7956	Research	1-12
BIME 7099, BME 7991, BME 7992, BME 7993, or BME 7996	Dissertation	1-12			
			Total Credit Hours:		2.0-24.0
Total Credit Hours: 2.0-24.0			1 semester varies; must be a PhD candidate		

¹ semester varies; must be a PhD candidate

Fifth Year		Credit Hours
Fall		
BIME 7099, Dissertation		1-12
BME 7991,		
BME 7992,		
BME 7993, or		
BME 7996		
BIME 6097, Research		1-12
BME 7951,		
BME 7952,		
BME 7953, or		
BME 7956		
BIME 6090 or Seminar		1
BME 6011		
Total Credit Hours:		3.0-25.0

Biomedical Engineering Objectives/ Program Outcomes

1. BME students will demonstrate their understanding of biology concepts for biomedical applications. Fundamental knowledge of biology is evaluated.
2. BME students will demonstrate their understanding of biomaterials concepts. Fundamental biomaterials knowledge and the students' ability to apply knowledge of biomaterials are evaluated.
3. BME students will demonstrate their understanding of biomechanics concepts. Fundamental knowledge of biomechanics is evaluated.
4. BME students will be able to design and carry out research experiments. Foundation of knowledge, application of knowledge, and research skills are evaluated.
5. BME students will be able to communicate research findings to diverse audiences.
6. BME students will be able to teach and disseminate knowledge.
7. BME students will conduct themselves in a professional and ethical manner in all biomedical engineering research.
8. BME students will critically evaluate scientific literature.