Biomedical Engineering (BME)

Biomedical Engineering (BME) Courses

BME 6011. Research Seminar. (1-0) 1 Credit Hour.
Prerequisites: Graduate student standing; consent of the instructor and the Graduate Advisor of Record. The seminar coordinator may require students to present their research. May be repeated for credit. The grade report for the course is either “CR” (satisfactory performance) or “NC” (unsatisfactory performance). (Formerly BME 5011 and BME 6991. Same as BME 6090 at UTHSCSA).

BME 6021. Supervised Teaching. (0-0) 1 Credit Hour.
Prerequisites: Doctoral student standing; consent of the instructor and the Graduate Advisor of Record. Supervised teaching of undergraduate or graduate students will be required for at least one semester. Students may be required to lecture at undergraduate courses or graduate courses in the field of their expertise. Students will work with the instructor of the course or with their research supervisor on the number of classes to be taught. (Same as BIME 6071 at UTHSCSA).

BME 6022. Supervised Teaching. (0-0) 2 Credit Hours.
Prerequisites: Doctoral student standing; consent of the instructor and the Graduate Advisor of Record. Supervised teaching of undergraduate or graduate students will be required for at least one semester. Students may be required to lecture at undergraduate courses or graduate courses in the field of their expertise. Students will work with the instructor of the course or with their research supervisor on the number of classes to be taught. (Same as BIME 6071 at UTHSCSA).

BME 6023. Supervised Teaching. (0-0) 3 Credit Hours.
Prerequisites: Doctoral student standing; consent of the instructor and the Graduate Advisor of Record. Supervised teaching of undergraduate or graduate students will be required for at least one semester. Students may be required to lecture at undergraduate courses or graduate courses in the field of their expertise. Students will work with the instructor of the course or with their research supervisor on the number of classes to be taught. (Same as BIME 6071 at UTHSCSA).

BME 6033. BME Engineering Analysis. (3-0) 3 Credit Hours.
Prerequisite: Graduate standing in engineering or consent of the instructor. This course is designed to introduce students to advanced mathematical and numerical methods necessary to solve problems frequently encountered in biomedical engineering. Topics covered include vector differential and integral calculus, linear algebraic equations, and ordinary and partial differential equations. (Same as EGR 6013. Same as BME 6093 offered in Fall 2007. Credit can be earned for only one of the following: BME 6033, BME 6093 taken Fall 2007, or EGR 6013).

BME 6043. Critical Thinking and Writing for BME. (3-0) 3 Credit Hours.
Prerequisites: Doctoral students who are either taking their qualifying examinations or have been admitted to candidacy; consent of the instructor and of the Graduate Advisor of Record. This course introduces students to grant applications and manuscript writing, and provides the opportunity to learn through writing and critiquing research proposals, manuscripts, abstracts, and scientific presentations.

BME 6051. Independent Study in Biomedical Engineering. (0-0) 1 Credit Hour.
Prerequisites: Graduate standing; consent of the instructor and of the Graduate Advisor of Record. Independent reading, research, discussion, and/or writing under the direction of a faculty member. For students needing specialized work not normally or not often available as part of regular course offerings. May be repeated for credit on a different topic of study, but no more than 6 credit hours, regardless of discipline, will apply toward the degree.

BME 6052. Independent Study in Biomedical Engineering. (0-0) 2 Credit Hours.
Prerequisites: Graduate standing; consent of the instructor and of the Graduate Advisor of Record. Independent reading, research, discussion, and/or writing under the direction of a faculty member. For students needing specialized work not normally or not often available as part of regular course offerings. May be repeated for credit on a different topic of study, but no more than 6 credit hours, regardless of discipline, will apply toward the degree.

BME 6053. Independent Study in Biomedical Engineering. (0-0) 3 Credit Hours.
Prerequisites: Graduate standing; consent of the instructor and of the Graduate Advisor of Record. Independent reading, research, discussion, and/or writing under the direction of a faculty member. For students needing specialized work not normally or not often available as part of regular course offerings. May be repeated for credit on a different topic of study, but no more than 6 credit hours, regardless of discipline, will apply toward the degree.

BME 6063. Introduction to Scientific Computing and Visualization. (3-0) 3 Credit Hours.
Prerequisites: Graduate standing; consent of the instructor. This is an introductory course covering the basic concepts and tools of scientific computing and visualization. It will cover basic UNIX operations (shell scripts and editors), UNIX tools (grep, awk, sed), basic visualization concepts and software tools (ParaView and VisIt). It will also cover parallel programming using Fortran/C/C++ with Message Passing Interface (MPI) and public domain libraries. (Credit can be earned for only one of the following: BME 6063, ME 4953 or ME 5013).

BME 6073. Professional Science Master's Practicum. (0-0) 3 Credit Hours.
Prerequisites: Graduate standing and consent of the Program Director. An internship in a Biomedical Engineering company. Students must have completed all required core courses and electives, and be in the writing phase of their thesis. May not be repeated for credit.

BME 6093. Topics in Biomedical Engineering. (3-0) 3 Credit Hours.
Prerequisites: Graduate standing; consent of the instructor and of the Graduate Advisor of Record. May be repeated for credit on a different topic of study.

BME 6103. Biology for Bioengineers. (3-0) 3 Credit Hours.
Prerequisites: Graduate standing; consent of the instructor and of the Graduate Advisor of Record. This course provides a broad background in biological concepts with specific attention given to biological processes important to bioengineering. Topics may include biochemistry, genetics, molecular biology, cell biology, and physiology. (Same as BIME 6004 at UTHSCSA. Credit cannot be earned for both BME 6103 and BIME 6004).
BME 6111. Introduction to Clinical Practices. (1-0) 1 Credit Hour. 
Prerequisites: Graduate standing; consent of the instructor and of the 
Graduate Advisor of Record. This course will provide an introduction to 
clinical medicine for graduate biomedical engineering students. It will 
provide the opportunity for the students to gain a working knowledge of 
engineering aspects as it relates to clinical practices. (Same as BIME 
6004 at UTHSCSA. Credit cannot be earned for both BME 6103 and 
BIME 6004).

BME 6123. Medical Device Design. (3-0) 3 Credit Hours. 
Prerequisites: Graduate standing; consent of the instructor and of the 
Graduate Advisor of Record. This course will educate students about 
current biomedical technologies and product development. 
Topics covered will include ideation, concept development, design 
methodologies, business plan basics, regulatory concepts for medical 
devices and intellectual property management.

BME 6131. Biomedical Project. (0-0) 1 Credit Hour. 
Prerequisites: Graduate standing; consent of the instructor and of the 
Graduate Advisor of Record and concurrent enrollment in BME 
6143. This project course will be offered to nonthesis students as an 
alternative to the comprehensive examination and will involve the 
design and development of a biomedical device or instrument. This 
course requires the final presentation of a prototype at the end of the 
semester and cannot be repeated for credit. The grade report for the 
course is either “CR” (satisfactory performance in Biomedical Project) or 
“NC” (unsatisfactory performance in Biomedical Project). (Credit cannot 
be earned for both BME 6131 and BIME 6961).

BME 6143. Biomedical Device Development. (3-0) 3 Credit Hours. 
Prerequisites: Graduate standing; consent of the instructor and of the 
Graduate Advisor of Record and BME 6123. This course involves the 
development of project proposals, testing of the design project and 
presentation of conceptual designs and a final prototype. Industrial 
collaboration and/or faculty sponsorship of these projects is encouraged.

BME 6203. Physiology for Engineers. (3-0) 3 Credit Hours. 
Prerequisite: Consent of the instructor or completion of BIME 6004 
(UTHSCSA). Designed to provide students with the essential graduate-
level background for applications and practices of biomedical 
engineering. Integration of the nervous, skeletal, muscle, cardiovascular, 
and other systems from the sub-cellular to the whole-organism level will be 
emphasized.

BME 6213. Cellular Engineering. (3-0) 3 Credit Hours. 
Prerequisites: Consent of the instructor and completion of BIME 6004 
(UTHSCSA) or BIME 6203. This course will focus on the use of 
engineering skills and principles in the analysis and design of cellular 
function including protein engineering, enzyme kinetics, drug design, 
receptor-ligand interactions, cell signaling, metabolism, growth, adhesion 
and migration.

BME 6223. Transport Processes in Biological Systems. (3-0) 3 Credit 
Hours. 
Prerequisites: Consent of the instructor and completion of BIME 6004 
(UTHSCSA) or BIME 6203. This course will introduce the concepts of 
quantitative modeling of biological systems, particularly with respect 
to mass, momentum and energy transport, and reaction kinetics. 
Areas of study will include the use of conservation laws in quantifying 
cardiopulmonary, renal, and thermal systems of the human physiology, 
and also apply these principles in developing artificial and extracorporeal 
devices, drug delivery and pharmacokinetic analysis.

BME 6233. Cardiovascular Bioengineering. (3-0) 3 Credit Hours. 
Prerequisites: BME 2103, BME 2003, and BME 6033 or consent of 
the instructor. This course introduces the bioengineering principles 
applied to the understanding and modeling of the cardiovascular system. 
Topics covered include anatomy of the human cardiovascular system; 
comparative anatomy; allometric scaling principles; cardiovascular 
molecular and cell biology; overview of continuum mechanics; form 
and function of blood, blood vessels, and the heart from an engineering 
perspective; normal, diseased and engineered replacement tissues and 
medical devices.

BME 6243. Mechanobiology. (3-0) 3 Credit Hours. 
Prerequisites: BME 6803 and BIME 6004 (UTHSCSA) or BME 6203. The 
course will explore the role of mechanical forces in modulating molecular 
cellular responses and signal transduction in cardiovascular, 
pulmonary, renal, skeletal and muscular systems, and impact in health 
and disease including stem cell differentiation and microgravity.

BME 6253. Bioheat Transfer. (3-0) 3 Credit Hours. 
Prerequisite: Graduate standing in engineering or consent of the 
instructor. Principles and applications of heat transfer in soft tissue. 
Topics may include fundamental conservation laws and governing 
equations of heat transfer, coupling of fluid and mass transport, and 
thermal activated nanoparticle transvascular transport. (Same as ME 
6253. Credit cannot be earned for both BME 6253 and ME 6253).

BME 6313. Computational Bioengineering and Biomedicine. (3-0) 3 
Credit Hours.

BME 6323. Bioinformatics. (3-0) 3 Credit Hours.
Prerequisites: Graduate standing and consent of the instructor. This 
course is an introduction to algorithms and methods in bioinformatics, 
with special emphasis on computational molecular biology. Areas of 
study include fundamental topics such as sequence alignment, gene 
prediction, RNA secondary structure prediction, phylogenetic inference, 
gene regulation, microarray data analysis, and advanced topics such 
as biological network analysis and next-generation sequencing data 
analysis. (Same as CS 5263. Credit cannot be earned for both BME 6313 and ME 6873.)

BME 6333. Stochastic Modeling in Bioengineering. (3-0) 3 Credit 
Hours. 
Prerequisite: Consent of the instructor. This course deals with 
development and application of probabilistic and uncertainty 
quantification methods in engineering. In particular, it covers random 
variable definitions, probability distributions, distribution selection, 
functions of random variables, numerical methods including Monte Carlo 
sampling, First Order Reliability Methods, component and systems 
reliability, and decision process under uncertainty. (Same as ME 5543. 
Credit cannot be earned for both BME 6333 and ME 5543).
BME 6343. Statistical Pattern Recognition and Data Mining in Biomedical Engineering. (3-0) 3 Credit Hours.
Prerequisites: BME 6333 and consent of the instructor. This course introduces the fundamental theories and algorithms of statistical classification, regression, and clustering including Bayesian networks, k-nearest neighbor classifier, linear classifier, decision tree, kernel approach for classification and regression, k-means clustering, and hierarchical clustering. Applications to, among others, modeling and analysis gene regulation, cancer prognosis and diagnosis, and gene functions prediction will be discussed in detail.

BME 6353. Computational Methods in Mass Spectrometry. (3-0) 3 Credit Hours.
Prerequisites: Completion of BME 6333 and consent of the instructor. This course will introduce basic computational processing methods of Mass Spectrometry (MS) for protein quantification and identification. Background topics includes protein, proteome, and proteomics; protein separation; protein digestion; peptide separation using HPLC; and introduction to Mass Spectrometry. The course will focus on computational methods for protein identification and characterization by MS; tandem MS or MS/MS analysis; de novo sequencing and database searching; and quantitative proteomics.

BME 6363. Multiscale Computational Modeling of Biomedical Systems. (3-0) 3 Credit Hours.
Prerequisites: EE 3413 or EE 5143 and consent of the instructor. This course is an introduction to the mathematical modeling, simulation and analysis of biological systems focusing on the cardiovascular system. The proposed topics include: fundamental physical/biochemistry laws to model a biological system, current mathematical modeling methods, introduction to the cardiovascular system with respect to LV functions, cellular functions, and gene expressions, applications of the modeling methods to the cardiovascular system, simulation tools for biological systems, and stability analysis and parameter sensitivity analysis of mathematical models for biological systems. (Same as EE 5243 Topic 1. Credit cannot be earned for BME 6363 and EE 5243 on the same topic).

BME 6523. Biological Laboratory Techniques in Biomedical Engineering. (3-0) 3 Credit Hours.
Prerequisites: Consent of the instructor and completion of BME 6004 (UTHSCSA) or BME 6203. Emphasis for this course will be on optical and fluorescence microscopy of mammalian cells and tissues using sterile technique. Common cell-biomaterial characterization techniques will be performed including live/dead analysis, apoptosis, and quantification of cell signaling markers using immunological and advanced fluorescence assays with practical applications to biomaterial design.

BME 6703. Biomedical Imaging. (3-0) 3 Credit Hours.
Prerequisite: Consent of the BME Program Director. This course will examine, from a systems perspective, the techniques used in a variety of medical imaging modalities, which include X-ray imaging, computed tomography (CT), magnetic resonance imaging (MRI), nuclear medicine (PET), ultrasound imaging, optical imaging and photoacoustic imaging. The fundamental principles and engineering underlying each imaging modality will be discussed and a performance analysis of each system will be examined. With approval from the BME Program Director, credit for this course can be counted towards satisfying the imaging core course for Ph.D. students. (Credit can be earned for only one of the following: BME 6703 or RADI 5015 at UTHSCSA.).

BME 6723. Bioinstrumentations. (3-0) 3 Credit Hours.
Prerequisite: Consent of the instructor. This course will cover fundamental principles of bioinstrumentation used in clinical and research measurements. Topics include: principles of transducer operation, amplifiers and signal processing, recording and display. Overview of specific examples in optical sensors, biological sensors, MRI, ultrasound, pacemakers and defibrillators.

BME 6733. Microfabrication and Application. (3-0) 3 Credit Hours.
Prerequisite: Consent of the instructor. This course describes the science of miniaturization which is essential for nanotechnology development. Microfabrication techniques for micro-electro-mechanical systems (MEMS), bioMEMS, microfluidics, and nanomaterials and their applications in biomedical research will be covered.

BME 6743. Biophotonics. (3-0) 3 Credit Hours.
Prerequisite: Consent of the instructor. This course describes the fundamental principles of biophotonics and their wide range of applications in biomedical research. Topics will include fundamentals of light interactions with molecules, cells, and tissues, optical biosensing (fiber-optic biosensors, evanescent wave biosensors, surface plasmon resonance biosensors), optical imaging (transmission microscopy, fluorescence microscopy, confocal scanning microscopy, multiphoton microscopy, fluorescence lifetime imaging microscopy), flow cytometry, photodynamic therapy, laser tweezers and laser scissors, and nanotechnology for biophotonics.

BME 6753. Biosensors: Fundamentals and Applications. (3-0) 3 Credit Hours.
Prerequisite: Consent of the instructor. This course will cover biosensing basics and in-depth view of device design and performance analysis. Topics include optical, electrochemical, acoustic, piezoelectric, and nano-biosensors. Emphasized applications in biomedical, environmental, and homeland security areas are discussed.

BME 6793. Topics in Image and Signal Processing. (3-0) 3 Credit Hours.
Prerequisite: Consent of the instructor. May be repeated for credit on a different topic of study.

BME 6803. Experimental Biomechanics. (3-0) 3 Credit Hours.
Prerequisites: BME 6033 and graduate standing. Fundamental applications of engineering mechanics in studying and modeling fluid flow, tissues, organs, and the whole human body will be discussed. This course includes a laboratory. (Formerly BME 6833. Same as ME 6833. Credit can be earned for only one of the following: BME 6803, BME 6833, ME 5833, or ME 6833.) (Formerly titled "Biomechanics I").

BME 6823. Advanced Biomechanics. (3-0) 3 Credit Hours.
Prerequisite: Graduate standing. This course covers biomechanics of biological tissue deformation and their constitutive equations. Topics may include elasticity, viscoelasticity, deformation, stress analysis, strain measurement, stress and strain in organs. Tissues covered may include heart, blood vessels, cartilage, and bone. (Formerly titled “Biomechanics II.”).

BME 6843. Tissue Mechanics. (3-0) 3 Credit Hours.
Prerequisite: BME 6803 or ME 3663 or consent of the instructor. Topics may include biomechanics characterization, modeling, and properties of regenerating tissues ranging from bone, cartilage, tendons, ligaments, skin, adipose tissue, nerves, bladder, eye, and pulmonary and cardiovascular tissues.
BME 6863. Mechanical Behavior of Living Tissues. (3-0) 3 Credit Hours.
Prerequisite: Consent of the instructor. Stress-strain relationships, viscoelasticity, mechanical properties, and mechanical modeling of collagenous and mineralized human tissues will be addressed. (Formerly BME 6513. Credit cannot be earned for both BME 6863 and BME 6513).

BME 6873. Biofluid Mechanics. (3-0) 3 Credit Hours.
Prerequisite: BME 6803 or ME 3663 or consent of the instructor. This course is an introduction to the fluid dynamics concepts necessary to design and perform research in physiological and biofluid mechanics, with a special emphasis in the quantitative understanding and fundamental engineering concepts of the human systemic and pulmonary circulation. Computational and experimental techniques will be studied with hands-on research projects based on student interest.

BME 6893. Topics in Biomechanics. (3-0) 3 Credit Hours.
Prerequisite: Consent of the instructor. May be repeated for credit on a different topic of study. (Same as ME 6893. Credit cannot be earned for both BME 6893 and ME 6893 when the topic is the same).

BME 6903. Biomaterials. (3-0) 3 Credit Hours.
Prerequisite: Consent of the instructor. Fundamentals of biomaterials science and engineering principles and concepts in repairing, replacing, and protecting human tissues and organs will be discussed. (Formerly BME 5903 and BME 6813. Same as ME 6813. Credit can be earned for only one of the following: BME 5903, BME 6903, BME 6813, ME 5813 or ME 6813).

BME 6913. Biomaterials II. (3-0) 3 Credit Hours.
Prerequisites: BME 6903 and consent of the instructor. Application of biomaterials in medicine and dentistry will be emphasized.

BME 6923. Tissue Engineering. (3-0) 3 Credit Hours.
Prerequisite: Graduate standing. This course is an introduction to the principles and current practice of tissue engineering endeavors. Strategies for choosing and using mammalian cells and scaffold biomaterials as well as select chemical and biophysical stimuli in order to obtain neotissue formation are reviewed in detail. Case studies are discussed to illustrate successful tissue engineering solutions of clinical problems pertinent to tissue regeneration. (Formerly BME 5923 and BME 6853. Credit can be earned for only one of the following: BME 5923, BME 6923, BME 6853, or BME 6923).

BME 6933. Tissue-Biomaterials Interactions. (3-0) 3 Credit Hours.
Prerequisite: Graduate standing. This course is an introduction to biocompatibility with special emphasis on the interaction of proteins, cells and tissues with biomaterials. Blood-material interactions are reviewed in detail. Case studies of implants are discussed to illustrate biomaterial selection as a key aspect to successful design of implant materials and prosthetic devices.

BME 6943. Biomaterials and Cell Signaling. (2-3) 3 Credit Hours.
Prerequisite: Graduate standing. Develop current understanding of topics in cell receptors and signaling mechanisms with application for biomaterial design. Focus will emphasize receptor-ligand communication, methods of identification and quantification, and pathways involved for cell to material stress response.

BME 6953. Biomaterials for Drug-Delivery/Pharmacology. (2-3) 3 Credit Hours.
Prerequisite: Graduate standing. Provides conceptual understanding of therapeutic agents used to regulate physiological function of cells comprising organ systems with relevance to biomaterials. Interpretation of drug mechanisms at a molecular, cellular and tissue level. Traditional reviews of pharmacodynamics and pharmacokinetics will be addressed with particular application to biomaterial interaction and drug-delivery systems.

BME 6961. Comprehensive Examination. (0-0) 1 Credit Hour.
Prerequisite: Approval of the Biomedical Engineering Committee on Graduate Studies to take the Comprehensive Examination. Independent study course for the purpose of taking the Comprehensive Examination for M.S. students in the nonthesis option. May be repeated once if approved by the Biomedical Engineering Committee on Graduate Studies and if the student received an "unsatisfactory performance" on his/her previous attempt on the Comprehensive Examination. Enrollment is required each term in which the Comprehensive Examination is taken if no other courses are being taken that term. The grade report for the course is either "CR" (satisfactory performance on the Comprehensive Examination) or "NC" (unsatisfactory performance on the Comprehensive Examination). (Credit cannot be earned for both BME 6961 and BME 6131).

BME 6963. Fundamentals to Polymer Science with Select Biomedical Applications. (3-0) 3 Credit Hours.
Prerequisites: Graduate standing and BME 6903; or consent of the instructor. This course introduces the fundamentals of polymer chemistry, characterization of the chemical and material properties, and determination of the biocompatibility of polymer formulations. Current applications of polymeric biomaterials in diagnostic and therapeutic devices, implants, tissue engineering and regenerative medicine are highlighted and discussed in detail.

BME 6973. Current Analytical Tools for Biomaterials Characterizations. (1-4) 3 Credit Hours.
Prerequisites: Graduate standing and BME 6903; or consent of the instructor. This course introduces the fundamentals of biomaterials characterizations and its limitations.

BME 6981. Master’s Thesis Research. (0-0) 1 Credit Hour.
Prerequisites: Master’s student standing; consent of the instructor and of the Graduate Advisor of Record. May be repeated for a maximum of 9 credit hours. (Same as BIME 6098 at UTHSCSA).

BME 6982. Master’s Thesis Research. (0-0) 2 Credit Hours.
Prerequisites: Master’s student standing; consent of the instructor and of the Graduate Advisor of Record. May be repeated for a maximum of 9 credit hours. (Same as BIME 6098 at UTHSCSA).

BME 6983. Master’s Thesis Research. (0-0) 3 Credit Hours.
Prerequisites: Master’s student standing; consent of the instructor and of the Graduate Advisor of Record. May be repeated for a maximum of 9 credit hours. (Same as BIME 6098 at UTHSCSA).

BME 6986. Master’s Thesis Research. (0-0) 6 Credit Hours.
Prerequisites: Master’s student standing; consent of the instructor and of the Graduate Advisor of Record. May be repeated for a maximum of 9 credit hours. (Same as BIME 6098 at UTHSCSA).

BME 6993. Topics in Biomaterials. (3-0) 3 Credit Hours.
Prerequisite: Consent of the instructor. May be repeated for credit on a different topic of study.
BME 7951. Doctoral Research. (0-0) 1 Credit Hour.
Prerequisites: Doctoral student standing; consent of the instructor and of the Graduate Advisor of Record. This course consists of independent, original research under the direction of a faculty advisor. May be repeated for a maximum of 18 credit hours. (Same as BIME 6097 at UTHSCSA).

BME 7952. Doctoral Research. (0-0) 2 Credit Hours.
Prerequisites: Doctoral student standing; consent of the instructor and of the Graduate Advisor of Record. This course consists of independent, original research under the direction of a faculty advisor. May be repeated for a maximum of 18 credit hours. (Same as BIME 6097 at UTHSCSA).

BME 7953. Doctoral Research. (0-0) 3 Credit Hours.
Prerequisites: Doctoral student standing; consent of the instructor and of the Graduate Advisor of Record. This course consists of independent, original research under the direction of a faculty advisor. May be repeated for a maximum of 18 credit hours. (Same as BIME 6097 at UTHSCSA).

BME 7956. Doctoral Research. (0-0) 6 Credit Hours.
Prerequisites: Doctoral student standing; consent of the instructor and of the Graduate Advisor of Record. This course consists of independent, original research under the direction of a faculty advisor. May be repeated for a maximum of 18 credit hours. (Same as BIME 6097 at UTHSCSA).

BME 7991. Doctoral Dissertation. (0-0) 1 Credit Hour.
Prerequisites: Admission to Doctoral candidacy; consent of the Graduate Advisor of Record and Dissertation Advisor. May be repeated for a maximum of 18 credit hours. (Same at BIME 7099 at UTHSCSA).

BME 7992. Doctoral Dissertation. (0-0) 2 Credit Hours.
Prerequisites: Admission to Doctoral candidacy; consent of the Graduate Advisor of Record and Dissertation Advisor. May be repeated for a maximum of 18 credit hours. (Same at BIME 7099 at UTHSCSA).

BME 7993. Doctoral Dissertation. (0-0) 3 Credit Hours.
Prerequisites: Admission to Doctoral candidacy; consent of the Graduate Advisor of Record and Dissertation Advisor. May be repeated for a maximum of 18 credit hours. (Same at BIME 7099 at UTHSCSA).

BME 7996. Doctoral Dissertation. (0-0) 6 Credit Hours.
Prerequisites: Admission to Doctoral candidacy; consent of the Graduate Advisor of Record and Dissertation Advisor. May be repeated for a maximum of 18 credit hours. (Same at BIME 7099 at UTHSCSA).