BME - BIOMEDICAL ENGINEERING

BME 2050 Introduction to Anatomy and Physiology for Biomedical Engineers Cr. 4
Detailed study of the anatomical structure and physiological function of the major systems of the body: skeletal, nervous, muscular, endocrine, circulatory, respiratory, digestive, excretory, and reproductive. Relevant biomedical engineering applications related to these major systems of the body. Offered Yearly.
Prerequisite: BIO 1510 with a minimum grade of C-
Corequisite: BME 2920

BME 2910 Biomedical Engineering Design Lab III Cr. 1
Application of engineering principles to biomedical engineering problems through laboratory and design exercises. Third of a six-semester sequence; analysis of musculoskeletal forces biomechanics. Offered Fall.
Prerequisite: BE 1200 with a minimum grade of C- and BE 1300 with a minimum grade of C- and BE 1310 with a minimum grade of C- and BE 1500 with a minimum grade of C-
Restriction(s): Enrollment is limited to students with a major in Biomedical Engineering or Biomedical Engg Honors; enrollment is limited to Undergraduate level students.
Course Material Fees: $25

BME 2920 Biomedical Engineering Design Lab IV Cr. 1
Application of engineering principles to biomedical engineering problems through laboratory and design exercises involving tissue biomechanics. Introduction to finite element modeling. Fourth of a six-semester sequence. Offered Winter.
Prerequisite: BE 2100 (may be taken concurrently) with a minimum grade of C- and ME 2420 (may be taken concurrently) with a minimum grade of C-
Corequisite: BME 2050
Restriction(s): Enrollment is limited to students with a major in Biomedical Engineering or Biomedical Engg Honors; enrollment is limited to Undergraduate level students.
Course Material Fees: $25

BME 3470 Biomedical Signals and Systems Cr. 3
Mathematical, engineering and computer techniques for describing and analyzing biomedical signals, including ECG, EEG, EMG, blood pressure, and tomographic images. Offered Fall.
Prerequisites: BME 3910 with a minimum grade of C- (may be taken concurrently) and ECE 3300 with a minimum grade of C- (may be taken concurrently)
Restriction(s): Enrollment is limited to students with a major in Biomedical Engineering or Biomedical Engg Honors; enrollment limited to students in the following programs: BS in Biomedical Engineering, BS in Chemical Engineering, BS in Civil Engineering, BS in Electrical Engineering, BS in Industrial Engineering, BS in Mechanical Engineering; enrollment is limited to Undergraduate level students; enrollment limited to students in the College of Engineering.
Course Material Fees: $50

BME 3910 Biomedical Engineering Design Lab V Cr. 1
Application of engineering principles to biomedical engineering problems through laboratory and design exercises. Focus on measurement, analysis, modeling, and interaction with biomedical signals from living systems. Fifth of a six-semester sequence. Offered Fall.
Prerequisites: BME 3470 with a minimum grade of C- (may be taken concurrently), ENG 3050 with a minimum grade of C- (may be taken concurrently), BE 1500 with a minimum grade of C- and MAT 2150 with a minimum grade of C-
Restriction(s): Enrollment is limited to students with a major in Biomedical Engineering or Biomedical Engg Honors; enrollment is limited to Undergraduate level students.
Course Material Fees: $25

BME 3920 Biomedical Engineering Design Lab VI Cr. 2
Application of engineering principles to biomedical engineering problems through laboratory and design exercises. Introduction to the capstone design process. Integration of the design process with the complete government regulation system for medical device design. Use of advanced CAE tools for analysis. Sixth of a six-semester sequence. Offered Winter.
Prerequisite: BME 3910 with a minimum grade of C-
Restriction(s): Enrollment is limited to students with a major in Biomedical Engineering or Biomedical Engg Honors; enrollment is limited to Undergraduate level students.
Course Material Fees: $100

BME 4010 Engineering Physiology Laboratory Cr. 1
Measurement and analysis of physiological signals on living systems, with focus on neural, cardiovascular, respiratory and muscular systems. Includes a student-designed experiment on a physiological system. Offered Winter.
Prerequisites: BME 2050 with a minimum grade of C-
Restriction(s): Enrollment is limited to students with a major in Biomedical Engineering or Biomedical Engg Honors; enrollment is limited to Undergraduate level students.
Course Material Fees: $30

BME 4210 Introduction to Biomechanics Cr. 3
Broad introduction to the application of mechanical engineering principles to biomedical engineering, including motion analysis, injury and forensic biomechanics, cardiovascular and pulmonary mechanics, and design of implants with mechanical functions. Offered Winter.
Prerequisite: ME 2420 with a minimum grade of C-
Restriction(s): Enrollment limited to students in the following programs: BS in Biomedical Engineering, BS in Chemical Engineering, BS in Civil Engineering, BS in Electrical Engineering, BS in Industrial Engineering, BS in Mechanical Engineering; enrollment is limited to Undergraduate level students; enrollment limited to students in the College of Engineering.

BME 4310 Introduction to Biomaterials Cr. 3
Broad introduction to the field of biomaterials and its application to tissue engineering, implant design, controlled drug delivery, and designer materials for therapeutic use. Offered Winter.
Prerequisite: ME 2420 with a minimum grade of C-
BME 4410 Introduction to Biomedical Instrumentation Cr. 3
Broad introduction to the use and design of instrumentation for biomedial applications, in both clinical and research use; includes filtering techniques, safety issues, and special concerns for implanted and external systems. Offered Winter.

Prerequisites: BME 3470 with a minimum grade of C- and ECE 3300 with a minimum grade of C-

Restriction(s): Enrollment is limited to students with a major in Biomedical Engineering or Biomedical Engg Honors; enrollment limited to students in the following programs: BS in Biomedical Engineering, BS in Chemical Engineering, BS in Civil Engineering, BS in Electrical Engineering, BS in Industrial Engineering, BS in Mechanical Engineering; enrollment is limited to Undergraduate level students; enrollment limited to students in the College of Engineering.

Course Material Fees: $25

BME 4910 Biomedical Engineering Capstone Design I Cr. 3
Satisfies General Education Requirement: Writing Intensive Competency
First in a two-semester sequence during which student teams develop a design to address a biomedical engineering challenge; includes discussions with clinical faculty, analysis of current solutions, and finalization of conceptual design. Offered Fall.

Prerequisite: BME 3920 with a minimum grade of C-

Restriction(s): Enrollment limited to students with a class of Junior or Senior; enrollment is limited to students with a major in Biomedical Engineering or Biomedical Engg Honors.

Course Material Fees: $50

BME 4920 Biomedical Engineering Capstone Design II Cr. 3
Second of a two-semester sequence. Students develop and test a prototype of their biomedical engineering design; culminates in a public design expo to exhibit student designs. Offered Winter.

Prerequisite: BME 4910 with a minimum grade of C-

Restriction(s): Enrollment limited to students with a class of Senior; enrollment is limited to students with a major in Biomedical Engineering or Biomedical Engg Honors; enrollment is limited to Undergraduate level students.

Course Material Fees: $50

BME 5010 Quantitative Physiology Cr. 4
Basic principles of human physiology presented from the engineering perspective. Bodily functions, their regulation and control discussed in quantitative terms and illustrated by mathematical models where feasible. Offered Fall, Winter.

Equivalent: CHE 5100, ECE 5100, ME 5100

BME 5020 Computer and Mathematical Applications in Biomedical Engineering Cr. 4
Application of numerical methods in biomedical engineering.


BME 5040 Fundamentals of Engineering Analysis Cr. 2
Intended to train biomedical engineering students, who have no engineering background, with fundamental principles of engineering and basics of an engineering programming language. It includes Matlab programming language and basics of engineering statics, dynamics, strength of materials, and electrical circuits. Offered Fall.

BME 5070 Anatomy for Engineers Cr. 4
A cadaver based anatomy course for undergraduate students and MS-level students in biomedical engineering. This hands-on course is intended to give the students directed experience of the study of human anatomy in relation to engineering principles. The histological study of tissues in relation to mechanical function of the organism is included in this study. Offered Fall.

Prerequisites: BME 2050 with a minimum grade of C-

Restriction(s): Enrollment is limited to Graduate or Undergraduate level students.

Course Material Fees: $225

BME 5130 Vehicle Safety Engineering Cr. 4
Role of vehicle in road safety, occupation and pedestrian injury mechanisms, measures of vehicle safety performance, driver behavior and vehicle interface. Use of new technology to improve vehicle safety. Offered Spring/Summer.

BME 5210 Musculoskeletal Biomechanics Cr. 4
Structure and properties of the major tissue components of the musculoskeletal system and evaluation of how tissues combine to provide support and motion to the body. Offered Fall.

Prerequisite: BME 5010 with a minimum grade of B-

Equivalent: ME 5160

BME 5220 Cellular and Tissue Biomechanics Cr. 3
Introduces biomechanics on the cellular to the tissue level. We will be studying mediators of cell mechanics such as the cytoskeleton, extracellular matrix and receptor-ligand interactions. Topics include cell adhesion, cell motility, and hemodynamics. Understanding of these topics will lend to discussion of translation of these forces up to the tissue level and subsequent tissue function. Offered Fall.

Prerequisites: MAT 2010 with a minimum grade of C- and MAT 2020 with a minimum grade of C-

BME 5310 Device and Drug Approval and the FDA Cr. 3
Government regulations and industrial procedures that lead to device/drug approval. Offered Spring/Summer.

BME 5350 Regenerative Biology and Medicine for Biomedical Engineers Cr. 4
Introduces students specializing in biomedical engineering and premedical students to the conceptual and methodological principles of modern regenerative biology and medicine. Includes a review of research methods and achievements in this field and the translational applications of regenerative biology to tissue engineering and the development of regenerative therapies. Offered Intermittently.

BME 5360 Histology and Embryology Cr. 4
Examines the normal structure and development of human tissues and organisms and the applications of this knowledge to biomedical engineering. Working with microscopes, students will study the molecular and cellular characteristics of different tissues and the lab procedures used for the analysis of tissue specimens. Particular attention is focused on technical principles of tissue engineering of human organs in experimental and clinical settings. Offered Intermittently.

BME 5370 Introduction to Biomaterials Cr. 4
Introduction to study of both biological materials (bone, muscle, etc.) and materials for medical applications. Topics include tissue properties and effects of pathology, biocompatibility, and design considerations. Offered Winter.

Prerequisites: BME 5010 with a minimum grade of C- (may be taken concurrently)

Equivalent: ME 5180
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
<th>Prerequisite(s)</th>
<th>Restriction(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BME 5380</td>
<td>Biocompatibility Cr. 4</td>
<td>4</td>
<td>Wound healing and the tissue response to foreign materials. The organization, activation, and mechanisms of the immune system. Bioactive materials and the molecular basis for surface recognition and masking. Offered Intermittently.</td>
<td>BME 5010 with a minimum grade of C or BMS 6550 with a minimum grade of C</td>
<td>Enrollment is limited to students with a major in Biomedical Engineering; enrollment limited to students in a Doctor of Philosophy degree.</td>
</tr>
<tr>
<td>BME 5425</td>
<td>Robotic Systems I Cr. 4</td>
<td>4</td>
<td>Introduction to robot kinematics and control. Computational algorithms for robot movement, sensor fusion, and intelligent behavior, which are needed to build a system that performs actions and interacts with its environment. Offered Winter.</td>
<td>BME 2550 with a minimum grade of C; BE 1500 with a minimum grade of C; BME 5020 with a minimum grade of C; or ECE 3040 with a minimum grade of C</td>
<td>Enrollment is limited to Graduate level students.</td>
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<tr>
<td>BME 5450</td>
<td>Microscopic Analysis: Methods &amp; Instrumentation Cr. 4</td>
<td>4</td>
<td>Provides the students specializing in biomedical engineering with a basis for understanding the modern methods of microscopic analysis and the design of different types of instrumentation used for microscopic analysis and imaging. Offered Winter.</td>
<td>BME 2050 with a minimum grade of C</td>
<td>Enrollment is limited to Graduate level students.</td>
</tr>
<tr>
<td>BME 5460</td>
<td>Lasers for Medical Applications Cr. 3</td>
<td>3</td>
<td>Summarizes the wealth of recent research on the principles, technologies and application of lasers in diagnostics, therapy and surgery. Includes an overview of optics, optical components used in a typical laser, key principles of lasers and radiation interactions with tissue. The respective types of the laser (solid state, gas, dye, and semiconductor) are reviewed to provide an understanding of the wide diversity, and therefore, the large possible choice of these devices for a specific diagnosis, treatment, or surgery. Offered Winter.</td>
<td>BME 2050 with a minimum grade of C</td>
<td>Enrollment is limited to Graduate level students.</td>
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<tr>
<td>BME 5995</td>
<td>Special Topics in Biomedical Engineering I Cr. 1-4</td>
<td>1-4</td>
<td>Topics as announced in Schedule of Classes. Offered Intermittently.</td>
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<td>Enrollment is limited to Graduate level students.</td>
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<tr>
<td>BME 6130</td>
<td>Accident Reconstruction Cr. 3</td>
<td>3</td>
<td>Passenger car and light truck behavior in collisions; recognition of roadway markings and vehicle damage used to analyze vehicle accidents and to use that evidence to reconstruct driver, vehicle and occupant dynamics at the time of the collision. Offered Spring/Summer.</td>
<td>BME 6470 with a minimum grade of C</td>
<td>Enrollment is limited to Graduate level students.</td>
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<tr>
<td>BME 6470</td>
<td>Smart Sensor Technology I: Design Cr. 4</td>
<td>4</td>
<td>Introduction to various types of sensors and the design of basic analog VLSI circuit building blocks. Offered Winter.</td>
<td>ECE 6570, PHY 6570</td>
<td>Enrollment is limited to Graduate level students.</td>
</tr>
<tr>
<td>BME 6480</td>
<td>Biomedical Instrumentation Cr. 4</td>
<td>4</td>
<td>Engineering principles of physiological measurements, signal conditioning equipment, amplifiers, recorders and transducers. Recent advances in instrumentation. Offered Winter.</td>
<td>BME 5020 with a minimum grade of B and ECE 3300 with a minimum grade of C</td>
<td>Enrollment is limited to Graduate level students.</td>
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<tr>
<td>BME 6991</td>
<td>Internship in Industry Cr. 1-4</td>
<td>1-4</td>
<td>Industrial internship in biomedical engineering. Offered Every Term.</td>
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<td>Enrollment is limited to Graduate level students.</td>
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<tr>
<td>BME 7010</td>
<td>Functional Anatomy Cr. 4</td>
<td>4</td>
<td>Gross dissection-based course designed to introduce students to the anatomical structures associated with major physiological functions important to biomedical engineering. Offered Spring/Summer.</td>
<td>BME 5010 with a minimum grade of B; or BME 7160 with a minimum grade of B</td>
<td>Enrollment is limited to Graduate level students.</td>
</tr>
<tr>
<td>BME 7020</td>
<td>Cardiovascular Systems Modeling Cr. 4</td>
<td>4</td>
<td>Application of engineering principals and mathematical and computational techniques to cardiovascular systems. Partial differential equations, signal transduction pathway and biortransport modeling, and introduction to systems biology approaches. Offered Winter.</td>
<td>BME 5010 with a minimum grade of C; or BME 5070 with a minimum grade of C</td>
<td>Enrollment is limited to Graduate level students.</td>
</tr>
<tr>
<td>BME 7030</td>
<td>Mechanisms and Models of Cellular Regulation for Engineering Cr. 3</td>
<td>4</td>
<td>Basic concepts of intracellular signaling pathways in response to environmental stimuli such as biomaterials and mechanical forces. Offered Intermittently.</td>
<td>BME 5010 with a minimum grade of C; or BME 5070 with a minimum grade of C</td>
<td>Enrollment is limited to Graduate level students.</td>
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<tr>
<td>BME 7040</td>
<td>Biomechanics of Blast-Related Injuries Cr. 3</td>
<td>4</td>
<td>This course covers new and old information developed by military researchers on injuries sustained by military personnel due to explosions or blasts caused by a variety of weapon systems. Injuries to body regions from head to foot are discussed. Particular emphasis is placed on injuries to the spine and lower extremities for the mounted soldier and on brain injury for both the mounted and dismounted soldier. The course includes the modeling of blast and blast-related effects on selected body regions. Offered Intermittently.</td>
<td>BME 7010 with a minimum grade of B; or BME 7160 with a minimum grade of B</td>
<td>Enrollment is limited to Graduate level students.</td>
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<tr>
<td>BME 7050</td>
<td>Applied Finite Element Methods in Biomechanical Analysis Cr. 4</td>
<td>4</td>
<td>Structural, stress, and strain analysis of the human body and/or artificial implants, using realistic biomechanical data for relevant tissues and material. Theoretical background and applied analysis. Offered Intermittently.</td>
<td>BME 5010 with a minimum grade of C; or BME 5070 with a minimum grade of C</td>
<td>Enrollment is limited to Graduate level students.</td>
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<tr>
<td>BME 7060</td>
<td>Impact Biomechanics I Cr. 4</td>
<td>4</td>
<td>Biomechanical response of the body regions and the whole body to impact. Mechanisms of injury in blunt impact. Effects of restraints on injury reduction. Development of test surrogates such as dummies. Offered Fall.</td>
<td>BME 5010 with a minimum grade of B; or BME 7160 with a minimum grade of B</td>
<td>Enrollment is limited to Graduate level students.</td>
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<tr>
<td>BME 7070</td>
<td>Biomechanics of Blast-Related Injuries Cr. 3</td>
<td>3</td>
<td>This course covers new and old information developed by military researchers on injuries sustained by military personnel due to explosions or blasts caused by a variety of weapon systems. Injuries to body regions from head to foot are discussed. Particular emphasis is placed on injuries to the spine and lower extremities for the mounted soldier and on brain injury for both the mounted and dismounted soldier. The course includes the modeling of blast and blast-related effects on selected body regions. Offered Intermittently.</td>
<td>BME 7010 with a minimum grade of B; or BME 7160 with a minimum grade of B</td>
<td>Enrollment is limited to Graduate level students.</td>
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<tr>
<td>BME 7080</td>
<td>Mechanical Engineering &amp; Design Cr. 4</td>
<td>4</td>
<td>Biomechanical response of the body regions and the whole body to impact. Mechanisms of injury in blunt impact. Effects of restraints on injury reduction. Development of test surrogates such as dummies. Offered Fall.</td>
<td>BME 5010 with a minimum grade of B; or BME 7160 with a minimum grade of B</td>
<td>Enrollment is limited to Graduate level students.</td>
</tr>
<tr>
<td>BME 7090</td>
<td>Biomechanics of Blast-Related Injuries Cr. 3</td>
<td>4</td>
<td>This course covers new and old information developed by military researchers on injuries sustained by military personnel due to explosions or blasts caused by a variety of weapon systems. Injuries to body regions from head to foot are discussed. Particular emphasis is placed on injuries to the spine and lower extremities for the mounted soldier and on brain injury for both the mounted and dismounted soldier. The course includes the modeling of blast and blast-related effects on selected body regions. Offered Intermittently.</td>
<td>BME 7010 with a minimum grade of B; or BME 7160 with a minimum grade of B</td>
<td>Enrollment is limited to Graduate level students.</td>
</tr>
</tbody>
</table>

**Course Material Fees**: $100

**Enrollment**: Limited to Graduate level students.
BME 7170 Experimental Methods in Impact Biomechanics Cr. 4
Lecture and laboratory combined; principles of impact testing; hands-on experience in use of impact-test equipment, including sled, pendulum, other types of impactors, and drop-test techniques. Offered Intermittently.
Prerequisite: BME 6480 with a minimum grade of B- and (BME 7100 with a minimum grade of B- or BME 7160 with a minimum grade of B-)
Restriction(s): Enrollment is limited to Graduate level students.
Course Material Fees: $100

BME 7180 Advanced Topics: Impact Biomechanics Cr. 4
A seminar format course in which advanced topics in impact biomechanics are investigated and presented by the class. Topics will include sports biomechanics (protective gear evaluation, standards certification, etc.) ballistic impacts (behind body armor effects, kinetic energy munitions, standards) and other various topics. The focus of the class will be the critical evaluation and review of literature. Offered Every Other Winter.
Prerequisite: BME 7160 with a minimum grade of B-
Restriction(s): Enrollment is limited to Graduate level students.

BME 7300 Advanced Topics in Biomaterials and Tissue Biomechanics Cr. 4
Seminar format: advanced topics presented to the class; lectures by the instructor and by the participants based on literature reviews. Topics determined by student interest. Offered Every Other Fall.
Prerequisite: BME 5210 with a minimum grade of C or BME 5370 with a minimum grade of C
Restriction(s): Enrollment is limited to Graduate level students.
Equivalent: ME 7180, MSE 7180

BME 7370 Biomaterial Interfaces Cr. 3
Prerequisite: BME 5370 with a minimum grade of B-
Restriction(s): Enrollment is limited to Graduate level students.

BME 7390 Tissue Engineering and Hybrid Systems Cr. 4
Seminar and project based approach to the design, development, analysis and application of organ and tissue replacement systems which incorporate processed materials and living cells. Offered Fall.
Prerequisites: BME 5370 with a minimum grade of C and (CHE 7100 with a minimum grade of C or BME 5020 with a minimum grade of C)
Restriction(s): Enrollment is limited to Graduate level students.
Equivalent: CHE 7390

BME 7425 Robotics Systems II Cr. 4
Project-based class to understand technology that interfaces computer engineering, software design, electronics and sensors with robotics. Advanced application areas of robotics will be covered including medical, military, space, vehicle robotics. Offered Winter.
Prerequisite: BME 5425 with a minimum grade of C or ECE 5425 with a minimum grade of C
Restriction(s): Enrollment is limited to Graduate level students; enrollment limited to students in the College of Engineering.
Equivalent: ECE 7425

BME 7470 Smart Sensor Technology II: Characterization and Fabrication Cr. 4
Integration of ongoing research in integrated technology of smart sensors. Design of smart sensor devices using computer simulation. Fabrication of smart sensor. Offered Spring/Summer.
Prerequisite: BME 6470 with a minimum grade of B- or ECE 6570 with a minimum grade of B- or PHY 6570 with a minimum grade of B-
Restriction(s): Enrollment is limited to Graduate level students.
Course Material Fees: $50
Equivalent: ECE 7570, PHY 7580

BME 7490 Biomedical Microsystems Cr. 4
Biomedical microsystems, with a focus on microfluidics and lab-on-a-chip technologies for medical diagnostics and biological research. Broad coverage of microscale physics; microfabrication methods; separation, purification, and other on-chip processes; biosensing. Offered Fall.
Prerequisite: ECE 5575 with a minimum grade of B- or ECE 6570 with a minimum grade of B-
Restriction(s): Enrollment is limited to Graduate level students.
Equivalent: CHE 7490, ECE 7590

BME 7670 Experimental Methods in Physiology Cr. 3
Basic principles and techniques for monitoring and reading EMGs, EEGs, ECGs, respiratory cycle, pulmonary function, galvanic skin response and polygraph, human acceleration response. Designing and carrying out a project involving human body acceleration measures and EMG responses; a second project will be designed and carried out using measurement techniques chosen by the students. Offered Winter.
Prerequisite: BME 5010 with a minimum grade of B-
Restriction(s): Enrollment is limited to Graduate level students.
Course Material Fees: $40

BME 7710 Magnetic Resonance Imaging Cr. 4
Science and engineering of magnetic resonance imaging; relaxation times, signal concepts, Fourier imaging, sampling, filtering, and sequence design. Offered Every Other Fall.
Prerequisite: BME 5020 with a minimum grade of B-
Restriction(s): Enrollment is limited to Graduate level students.

BME 7720 MR Imaging of Neurovascular Disease Cr. 3
Recent advances in MRI technology applied to human brain vascular diseases. Methods include: 3D anatomical imaging, diffusion tensor imaging, functional brain imaging, perfusion imaging, and susceptibility weighted imaging. Offered Every Other Fall.
Prerequisite: BME 5010 with a minimum grade of B-
Restriction(s): Enrollment is limited to Graduate level students; enrollment limited to students in the College of Engineering.
Equivalent: PYC 7320

BME 7730 Medical Imaging Systems Cr. 3
Exposes students to the world of medical and biomedical imaging with emphasis on principles, approaches and applications of each modern imaging modality. Basic knowledge of MATLAB programming language is required. Offered Fall.
Restriction(s): Enrollment is limited to Graduate level students.
Equivalent: ECE 7740

BME 7990 Directed Study Cr. 1-4
Independent projects on subjects of interest in the field of biomedical engineering. Offered Every Term.
Restriction(s): Enrollment is limited to Graduate level students. Repeatable for 12 Credits

BME 7995 Special Topics in Biomedical Engineering II Cr. 1-4
Topics as announced in Schedule of Classes. Offered Intermittently.
Restriction(s): Enrollment is limited to Graduate level students.

BME 7996 Research Cr. 1-4
Combined experimental and analytical study of a problem in the field of biomedical engineering. Offered Every Term.
Restriction(s): Enrollment is limited to Graduate level students. Repeatable for 12 Credits

BME 8070 Seminar in Biomedical Engineering Cr. 1
Lectures on biomedical engineering and related fields by guest speakers, faculty, and students. M. S. and Ph.D. students are required to take one semester. Offered Fall, Winter.
Restriction(s): Enrollment is limited to Graduate level students.
BME 8080 BME PhD Qualifying Exam Cr. 1
Qualifying exam and procedures to write the exam. Offered Winter.
Restriction(s): Enrollment is limited to students with a major in Biomedical Engineering; enrollment limited to students in a Doctor of Philosophy degree.

BME 8999 Master’s Thesis Research and Direction Cr. 1-8
Offered Every Term.
Restriction(s): Enrollment is limited to students with a major in Biomedical Engineering; enrollment is limited to Graduate level students.
Repeatable for 8 Credits

BME 9990 Pre-Doctoral Candidacy Research Cr. 1-8
Research in preparation for doctoral dissertation. Offered Every Term.
Restriction(s): Enrollment is limited to students with a major in Biomedical Engineering; enrollment is limited to Graduate level students.
Repeatable for 8 Credits

BME 9991 Doctoral Candidate Status I: Dissertation Research and Direction Cr. 7.5
Offered Every Term.
Restriction(s): Enrollment is limited to students with a major in Biomedical Engineering; enrollment is limited to Graduate level students.

BME 9992 Doctoral Candidate Status II: Dissertation Research and Direction Cr. 7.5
Offered Every Term.
Prerequisite: BME 9991 with a minimum grade of S
Restriction(s): Enrollment is limited to students with a major in Biomedical Engineering; enrollment is limited to Graduate level students.

BME 9993 Doctoral Candidate Status III: Dissertation Research and Direction Cr. 7.5
Offered Every Term.
Prerequisite: BME 9992 with a minimum grade of S
Restriction(s): Enrollment is limited to students with a major in Biomedical Engineering; enrollment is limited to Graduate level students.

BME 9994 Doctoral Candidate Status IV: Dissertation Research and Direction Cr. 7.5
Offered Every Term.
Prerequisite: BME 9993 with a minimum grade of S
Restriction(s): Enrollment is limited to students with a major in Biomedical Engineering; enrollment is limited to Graduate level students.

BME 9995 Candidate Maintenance Status: Doctoral Dissertation Research and Direction Cr. 0
Offered Every Term.
Restriction(s): Enrollment is limited to students with a major in Biomedical Engineering; enrollment is limited to Graduate level students.
Course Material Fees: $384.7
Repeatable for 0 Credits