

Fall 2020 Course Descriptions as of 04/05/2020 08:10 PM

Information in Browse Course Catalog is subject to change. Information is term specific. Please refer to the appropriate term when searching for course content. Key to Course Descriptions may be found at: http://rcs.registrar.arizona.edu/course_descriptions_key.

Biomedical Engineering (BME)

BME 210: Intermediate Engineering Design: Electronics, Mechanisms, Controllers (3 units)

Description: The purpose of this course is to introduce students to engineering design, development and fabrication tools. Student will learn general concepts of mechanical, electronic and software design. We will be using an Integrated Development Environment to program a microcontroller, Computer Aided Design to create solid models, Electronic Design Automation to create printed circuit board layouts, and a subset of manufacturing processes to complete engineering projects. While students will work in design teams in the laboratory, each student will need to become proficient in the use of all tools presented in this course. Students will need to present their laboratory work in verbal, written and illustrative form.

Grading basis: Regular Grades

Career: Undergraduate

Flat Fee: \$90

Course Components:	Laboratory	Required
	Lecture	Required

Course typically offered:

Main Campus: Spring

Enrollment requirement: BME majors only. ECE 175.

BME 214: Introduction to Biomechanics (3 units)

Description: This course will introduce the fundamentals of statics and dynamics in the context of real world problems in biomechanics. Examples will be used throughout the course that focus on how these fundamentals can be used to better understand the human body, from molecule to organ.

Grading basis: Regular Grades

Career: Undergraduate

Course Components:	Lecture	Required
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Course typically offered:

Main Campus: Fall

Recommendations and additional information: PHYS 141 and Math 129 must be completed before taking BME 214.

Enrollment requirement: Majors: all undergraduate College of Engineering majors acceptable.

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

BME 295C: Challenges in Biomedical Engineering (1 unit)

Description: This colloquium will explore themes of biomedical engineering in the context of health-related challenges. Each week a new challenge will be presented, the biomedical engineering principles that can be used to address this challenge explained, and the state of the art in research and clinical practice described. By the end of the colloquium, students should have an overall understanding of how the many facets of biomedical engineering research (biomaterials, imaging, biocomputing, and nanomedicine, among others) can be used to address critical problems in human health.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Colloquium Required

Course typically offered:

Main Campus: Spring

BME 299: Independent Study (1 - 6 units)

Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.

Grading basis: Alternative Grading: S, P, F

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Spring, Summer

BME 299H: Honors Independent Study (1 - 6 units)

Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Spring, Summer

Enrollment requirement: Student must be active in the Honors College.

Honors Course: Honors Course

Honors Course: Honors Course

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

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BME 330: Biomedical Instrumentation (4 units)

Description: This course is designed to provide students with theoretical knowledge and practical experience to design, conduct, and analyze measurements on living systems. Topics will include human biosignals, transducers, analog and digital signal processing, electrical safety, noise minimization, experimental design, and statistical analysis. Common types of measurements made clinically will be discussed, and several will be made and analyzed in lab.

Grading basis: Regular Grades

Career: Undergraduate

Flat Fee: \$64

Course Components:	Laboratory	Required
	Lecture	Required

Course typically offered:

Main Campus: Spring

Recommendations and additional information: ECE 207, PSIO 201.

Enrollment requirement: Adv Stdg: Engineering.

BME 331: Introduction to Fluid Mechanics (3 units)

Description: Fundamentals of fluid mechanics covering properties of fluids, fluid statics, dynamics of incompressible viscous and inviscid flows, control volume formulations of continuity, momentum and energy equations, dimensional analysis, viscous pipe flow, boundary layers and drag.

Grading basis: Regular Grades

Career: Undergraduate

Course Components:	Lecture	Required
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Also offered as: AME 331

Course typically offered:

Main Campus: Fall

Home department: Aerospace & Mechanical Engineering

Enrollment requirement: AME 230 (or ABE 284 for BME and BE majors only), AME 250 (or PHYS 141 for BME majors only), and MATH 254. Adv Stdg: Engineering.

BME 376: Biomedical Statistics (3 units)

Description: This course covers application of statistics to biomedical engineering and research. Topics include describing and summarizing biomedical data, study designs, probability distributions, diagnostic testing, and statistical inference for biomedical applications. All topics will involve use of R Statistical Computing Software.

Grading basis: Regular Grades

Career: Undergraduate

Course Components:	Lecture	Required
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Course typically offered:

Main Campus: Fall

Enrollment requirement: Adv Stdg: Engineering and MATH 129.

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

BME 416: Biomedical Imaging (3 units)

Description: Introduction to the mathematical, physical, engineering and biological principles important to a variety of biomedical imaging methods including optical imaging, x-ray imaging, CT, PET, SPECT and MRI.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Co-convened with: BME 516

Course typically offered:

Main Campus: Spring

Recommendations and additional information: Advanced standing in the College of Engineering or department consent.

BME 417: Measurement and Data Analysis in Biomedical Engineering (3 units)

Description: Topics in biomedical instrumentation, sensors, physiological measurements, analog and digital signal processing, data acquisition, data reduction, statistical treatment of data, and safety issues. Course includes both lecture and structured laboratory components.

Grading basis: Regular Grades

Career: Undergraduate

Flat Fee: \$50

Course Components: Lecture Required

Equivalent to: ECE 417

Also offered as: ECE 417

Co-convened with: BME 517

Course typically offered:

Main Campus: Spring

Enrollment requirement: Senior status only.

BME 420: Biophotonics (3 units)

Description: This course will cover the interaction of light with biological material. A particular focus will be the use of photonics in medical diagnostics. The course will include introductory biological concepts such as DNA, proteins, cells, and tissues. In addition, the course will teach the principles and applications of bioimaging, spectroscopy, and biosensors, as well as summarize recently published progress in the field.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Also offered as: OPTI 420

Co-convened with: BME 520

Course typically offered:

Main Campus: Spring

Enrollment requirement: Junior or Senior, and must have taken prior or be co-enrolled in BME 330 or OPTI 210 or OPTI 310.

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

BME 447: Sensors and Controls (3 units)

Description: Principles of electric circuits. Selection, interfacing and calibration of digital and analog sensors to measure physical variables. Optical electrochemical and piezoelectric biosensors. Basic bioprocess control.

Grading basis: Regular Grades

Career: Undergraduate

Flat Fee: \$100

Course Components:	Laboratory	May Be Offered
	Lecture	Required

Also offered as: BE 447

Co-convened with: BME 547

Course typically offered:

Main Campus: Fall

Home department: Biosystems Engineering

Enrollment requirement: Adv. Stdg: Engineering, and BE 201 or BME 210.

BME 461: Biological and Synthetic Materials (3 units)

Description: Discussion of structure and properties of biological materials and composites, such as bone, teeth and elastin. Synthetic materials as substitutes for biological materials, biocompatibility.

Grading basis: Regular Grades

Career: Undergraduate

Course Components:	Lecture	Required
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Also offered as: MSE 461

Co-convened with: MSE 561

Course typically offered:

Main Campus: Fall

Home department: Materials Science & Engineering

Enrollment requirement: Adv Stdg: Engineering.

BME 466: Biomechanical Engineering (3 units)

Description: Subjects selected yearly from: biosolids, biofluids, biotransport; physiological systems; bioheat transfer.

Grading basis: Regular Grades

Career: Undergraduate

Flat Fee: \$11

Course Components:	Lecture	Required
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Equivalent to: BME 466

Also offered as: AME 466

Co-convened with: AME 566

Course typically offered:

Main Campus: Spring

Enrollment requirement: Adv Stdg: Engineering.

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

BME 477: Introduction to Biomedical Informatics (3 units)

Description: Driven by efforts to improve human health and healthcare systems, this course will cover relevant topics at the intersection of people, health information, and technology. Specifically, we will survey the field of biomedical informatics that studies the effective uses of biomedical data, information, and knowledge from individuals (patients), populations, biomolecules, and cellular processes, for scientific inquiry, problem solving, and decision making. We will explore foundations and methods from both biomedical and computing perspectives, including hands-on experiences with systems, tools, and technologies in the healthcare ecosystem.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Also offered as: SIE 477

Course typically offered:

Main Campus: Fall

Enrollment requirement: (ECE 175 or CSC 127A or CSC 110 or consent of instructor), and Engineering Advanced Standing.

BME 480: Translational Biomedical Engineering (3 units)

Description: The purpose of this course is to educate students on the benefits, methods, and difficulties of translating laboratory results into products that are successful in the clinic and in the marketplace. Topics include: laws and regulations for animal use, human subjects protection, good laboratory and good clinical practices, Food and Drug Administration (FDA) approval procedures for drugs and devices, ethics case studies, technology transfer, resources for small business start ups, and product life cycle.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Course typically offered:

Main Campus: Spring

Enrollment requirement: Adv Stdg: Engineering.

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-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

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Description: Biomedical engineering increasingly involves manipulation of materials on the scale of nanometers. This spatial scale is compatible with such advanced tasks as manipulation of subcellular structures, interfacing cellular functions with electronics, assembly of biomimetic materials and devices, or synthetic biology. Such technologies may help develop new medical diagnostic tools or treatment modalities, augment impaired functions of the body or replace those that were lost as a result of injuries or congenital disorder. This course will provide an overview of fundamental concepts underlying these technological advances, such as quantum mechanics, chemical kinetics, and materials science. Subsequently, experimental tools appropriate for working on the nanoscale will be introduced. Finally, the class will review applications of nanotechnology with particular focus on applications addressing biological and medical needs.

Main Campus: Fall

Main Campus: Spring

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

BME 492: Directed Research (1 - 6 units)

Description: Individual or small group research under the guidance of faculty.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated for a maximum of 30 units.

Course typically offered:

Main Campus: Fall, Spring, Summer

Student Engagement Activity: Discovery

Student Engagement Competency: Innovation and Creativity

BME 493B: Clinical and Translational Research Experience (3 units)

Description: The goal of this course is to introduce students to the basic concepts of Clinical and Translational Research and to provide a hand on experience in clinical research. Course is conducted in conjunction with the Department of Emergency Medicine and this is the primary site of the course. This course provides undergraduates, medical students, nurses, pharmacists and EMS workers the opportunity to be involved in hospital-based clinical research under the supervision of an assigned attending physician, research nurses, or nurse managers. Course participants will function as clinical research partners to assist with selection of patients for studies, conducting clinical research and performing data collection projects. This will be done through scheduled clinical shifts in the Department of Emergency Medicine. The expected benefits of the course will be exposure to clinical research, exposure to clinical emergency medicine, interaction with faculty and staff in the Department of Emergency Medicine, and the potential for the development of individual research.

Grading basis: Alternative Grading: S, P, F

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated for a maximum of 24 units.

Co-convened with: BME 593B

Course typically offered:

Main Campus: Fall, Spring

Student Engagement Activity: Discovery

Student Engagement Competency: Innovation and Creativity

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

BME 497G: Clinical Rotation (1 unit)

Description: An introduction to clinical practice for undergraduate students in biomedical engineering. The course is divided into lectures during regular class time, hospital visits and grand rounds lectures. The regular classroom lectures are focused on hospital environment, patient flow, clinical regulations and applications of biomedical technologies. The hospital tours include visits of hospital units such endoscopy, radiology, operating room, ICU, pathology and various clinical units. Students will need to attend at least half of the organized hospital tours. Students will also need to attend grand rounds lectures discussing patient case studies. Hospital visits and grand rounds lectures will occur outside regular class hours and might also occur outside regular business hours. Hospital site is primarily the University Medical Center but might also include University satellites not on main campus. In order to be able to complete this course students will need to pass regulatory, safety and behavioral training at the beginning of the course. Students will have to complete immunizations required when working in a hospital environment.

Grading basis: Regular Grades

Career: Undergraduate

Course Components: Lecture Required

Course typically offered:

Main Campus: Fall

Recommendations and additional information: BME 330.

Enrollment requirement: Adv Stdg: Engineering.

Student Engagement Activity: Professional Development

Student Engagement Competency: Professionalism

BME 499: Independent Study (1 - 3 units)

Description: Qualified junior or senior level undergraduate students working on an individual basis with professors who have agreed to supervise such work.

Grading basis: Alternative Grading: S, P, F

Career: Undergraduate

Course Components: Independent Study Required

Repeatable: Course can be repeated for a maximum of 6 units.

Course typically offered:

Main Campus: Fall, Spring, Summer

BME 510: Biology for Biomedical Engineering (3 units)

Description: Basic biological principles governing cellular processes and links to applications in medicine, engineering, and applied sciences.

Grading basis: Regular Grades

Career: Graduate

Course Components: Lecture Required

Course typically offered:

Main Campus: Fall

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

BME 511: Physiology for Biomedical Engineering (3 units)

Description: Fundamental concepts and principles in physiology relevant to the field of bioengineering and including a survey of materials necessary for an understanding of physiological principles.

Grading basis: Regular Grades

Career: Graduate

Course Components: Lecture Required

Equivalent to: PSIO 511

Also offered as: PSIO 511

Course typically offered:

Main Campus: Spring

BME 516: Biomedical Imaging (3 units)

Description: Introduction to the mathematical, physical, engineering and biological principles important to a variety of biomedical imaging methods including optical imaging, x-ray imaging, CT, PET, SPECT and MRI. Graduate-level requirements include a written term paper and an oral presentation. See syllabus for complete course requirements and grading scale.

Grading basis: Regular Grades

Career: Graduate

Course Components: Lecture Required

Co-convened with: BME 416

Course typically offered:

Main Campus: Fall

BME 517: Measurement and Data Analysis in Biomedical Engineering (3 units)

Description: Topics in biomedical instrumentation, sensors, physiological measurements, analog and digital signal processing, data acquisition, data reduction, statistical treatment of data, and safety issues. Course includes both lecture and structured laboratory components. Graduate-level requirements include building a biomedical instrument that implements a novel solution to a real-life problem. Examinations for graduate students will include additional essay questions that test ability to formulate creative solutions. Course includes both lecture and structured laboratory components.

Grading basis: Regular Grades

Career: Graduate

Flat Fee: \$50

Course Components:	Laboratory Lecture	May Be Offered Required
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Equivalent to: ECE 517

Also offered as: ECE 517

Co-convened with: BME 417

Course typically offered:

Main Campus: Spring

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

BME 520: Biophotonics (3 units)

Description: This course will cover the interaction of light with biological material. A particular focus will be the use of photonics in medical diagnostics. The course will include introductory biological concepts such as DNA, proteins, cells, and tissues. In addition, the course will teach the principles and applications of bioimaging, spectroscopy, and biosensors, as well as summarize recently published progress in the field.

Grading basis: Regular Grades

Career: Graduate

Course Components: Lecture Required

Also offered as: OPTI 520

Co-convened with:

Course typically offered:

Main Campus: Spring

BME 522: Contrast Agents, Molecular Imaging, and Kinetics (3 units)

Description: Current topics in drug discovery and molecular imaging involve the integration of a series of research modalities. The pharmaceutical Industry uses these modalities in their developmental and regulatory efforts to attain new indications. As well, the medical device community is continually developing new techniques to enhance medical imaging for the earliest detection of disease. Furthermore, kinetic ADME studies (absorbption, distribution, metabolism, and excretion) are required so as to determine the fate of these agents as an indicator of efficacy and toxicity.

Grading basis: Regular Grades

Career: Graduate

Course Components: Lecture Required

Equivalent to: CBIO 524, PHCL 524

Also offered as: CBIO 522, OPTI 522, PCOL 522, PHCL 522

Course typically offered:

Main Campus: Spring

Recommendations and additional information: Undergraduate seniors wishing to enroll must have a 3.00 or greater GPA.

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

BME 547: Sensors and Controls (3 units)

Description: Principles of electric circuits. Selection, interfacing and calibration of digital and analog sensors to measure physical variables. Optical electrochemical and piezoelectric biosensors. Basic bioprocess control. Graduate-level requirements include a special project.

Grading basis: Regular Grades

Career: Graduate

Flat Fee: \$100

Course Components:	Laboratory	May Be Offered
	Lecture	Required

Also offered as: BE 547

Co-convened with: BME 447

Course typically offered:

Main Campus: Fall

Home department: Biosystems Engineering

BME 561: Biological and Synthetic Materials (3 units)

Description: Discussion of structure and properties of biological materials and composites, such as bone, teeth and elastin. Synthetic materials as substitutes for biological materials, biocompatibility. Graduate-level requirements include additional computational and written exercises.

Grading basis: Regular Grades

Career: Graduate

Course Components:	Lecture	Required
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Equivalent to: BME 561

Also offered as: MSE 561

Co-convened with: MSE 461

Course typically offered:

Main Campus: Fall

Home department: Materials Science & Engineering

BME 566: Biomechanical Engineering (3 units)

Description: Subjects selected yearly from: biosolids, biofluids, biotransport; physiological systems; bioheat transfer. Graduate-level requirements include a project and additional reading assignments.

Grading basis: Regular Grades

Career: Graduate

Flat Fee: \$11

Course Components:	Lecture	Required
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Equivalent to: BME 566

Also offered as: AME 566

Co-convened with: AME 466

Course typically offered:

Main Campus: Spring

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

Description: Driven by efforts to improve human health and healthcare systems, this course will cover relevant topics at the intersection of people, information, and technology. Specifically, we will survey the field of biomedical informatics that studies the effective uses of biomedical data, information, and knowledge from molecules and cellular processes to individuals and populations, for scientific inquiry, problem solving, and decision making. We will explore foundations and methods from both biomedical and computing perspectives, including hands-on experiences with systems, tools, and technologies in the healthcare system. Graduate students will be required to submit an additional assignment or project.

Main Campus: Fall

Main Campus: Spring

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

BME 581B: Cell and Tissue Engineering (3 units)

Description: Development of biological engineering methods including applied genetics, metabolic regulation, and bioreactors employed in industrial processes for manufacture of pharmaceuticals and in the design of tissue engineered devices to replace normal physiological function. Graduate-level requirements include two additional design projects, homework problems requiring a greater degree of mathematics, and exams containing questions which evaluate a higher level of thought processes.

Grading basis: Regular Grades

Career: Graduate

Flat Fee: \$100

Course Components:	Laboratory Lecture	May Be Offered Required
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Equivalent to: BME 581B, CHEE 581B

Also offered as: BE 581B, CHEE 581B

Co-convened with: ABE 481B

Course typically offered:

Main Campus: Spring

BME 583: Micro Biomechanics (3 units)

Description: Thermodynamics, mechanics, and structures of biomolecules (e.g., proteins and DNA) and cells. Deformation mechanisms and theories for both flexible and semi-rigid chains, and the applications in biomolecules and cells. Experimental micro biomechanics techniques for both biomolecules and cells. Graduate-level requirements include comprehensively review one of the mainstream experimental techniques in micro biomechanics and submit a final report.

Grading basis: Regular Grades

Career: Graduate

Course Components:	Lecture	Required
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Equivalent to: BME 583

Also offered as: AME 583

Co-convened with: BME 483

Course typically offered:

Main Campus: Spring

Home department: Aerospace & Mechanical Engineering

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

BME 584: Cardiovascular Muscle Biology and Disease (3 units)

Description: This course is geared towards obtaining knowledge and quantitative insights in the molecular and integrative biology of muscle with an emphasis on cardiac muscle and the heart. It will focus on the molecular mechanisms that underlie the function and plasticity of muscle, including mechanisms of disease. In addition to lectures, the course will promote critical thinking and analysis skills by reading and analyzing primary research articles. Graduate-level requirements include writing a research proposal that addresses an unresolved area in muscle biology (to be selected from a list of research articles provided at the beginning of the semester).

Grading basis: Regular Grades

Career: Graduate

Course Components: Lecture Required

Equivalent to: ANAT 584, CBA 584, NRSC 584

Also offered as: CMM 584, MCB 584, PSIO 584

Co-convened with: BME 484

Course typically offered:

Main Campus: Spring

Home department: Physiology, Graduate Level

BME 585: Nanoscience and Nanotechnology for Biomedical Engineers (3 units)

Description: Biomedical engineering increasingly involves manipulation of materials on the scale of nanometers. This spatial scale is compatible with such advanced tasks as manipulation of subcellular structures, interfacing cellular functions with electronics, assembly of biomimetic materials and devices, or synthetic biology. Such technologies may help develop new medical diagnostic tools or treatment modalities, augment impaired functions of the body or replace those that were lost as a result of injuries or congenital disorder. This course will provide an overview of fundamental concepts underlying these technological advances, such as quantum mechanics, chemical kinetics, and materials science. Subsequently, experimental tools appropriate for working on the nanoscale will be introduced. Finally, the class will review applications of nanotechnology with particular focus on applications addressing biological and medical needs. Graduate students will prepare a presentation in class on a subject illustrating one of the topics in the syllabus, as directed by instructor. Content of tests, quizzes, and homework may vary for graduate students.

Grading basis: Regular Grades

Career: Graduate

Course Components: Lecture Required

Co-convener with: BME 485

Course typically offered:

Main Campus: Fall

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

BME 586: Biomaterial-Tissue Interactions (3 units)

Description: Biomaterials and their applications; protein-surface and blood-biomaterial interactions, inflammation, wound healing, biocompatibility, implants, and tissue engineering. Graduate-level requirements include: Three(3) journal club presentations and peer reviews for all presentations. Term paper requires extensive theoretical background and should be formatted to a grant proposal to external funding agencies such as NSF or NIH.

Grading basis: Regular Grades

Career: Graduate

Course Components: Lecture Required

Equivalent to: BME 586

Also offered as: BE 586

Co-convened with: ABE 486

Course typically offered:

Main Campus: Spring

BME 593B: Clinical and Translational Research Experience (3 units)

Description: The goal of this course is to introduce students to the basic concepts of Clinical and Translational Research and to provide a hand on experience in clinical research. Course is conducted in conjunction with the Department of Emergency Medicine and this is the primary site of the course. This course provides undergraduates, medical students, nurses, pharmacists and EMS workers the opportunity to be involved in hospital-based clinical research under the supervision of an assigned attending physician, research nurses, or nurse managers. Course participants will function as clinical research partners to assist with selection of patients for studies, conducting clinical research and performing data collection projects. This will be done through scheduled clinical shifts in the Department of Emergency Medicine. The expected benefits of the course will be exposure to clinical research, exposure to clinical emergency medicine, interaction with faculty and staff in the Department of Emergency Medicine, and the potential for the development of individual research. Graduate-level requirements include demonstrating mastery of the breadth of the course by examination.

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Independent Study Required

Repeatable: Course can be repeated for a maximum of 24 units.

Co-convened with: BME 493B

Course typically offered:

Main Campus: Fall, Spring, Summer

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

BME 597G: Research Methods in Biomedical Engineering (1 - 3 units)

Description: A requirement of all students in the BME Graduate Program. Students must complete laboratory rotations of 45 contact hours per unit of rotation in any participating faculty lab. Students choose and schedule their rotations after becoming familiar with the faculty research interests. The rotations expose the student to a number of research areas in Biomedical Engineering and assist in the student's choice of a dissertation/thesis advisor. Prior to performing a rotation, the student should meet with the prospective mentor to discuss the nature of the rotation. A brief pre- and post-rotation form of what was accomplished in each rotation must be submitted to the Program with the rotation faculty's signature at the end of each rotation. Ph.D. candidates in Biomedical Engineering must complete at least 2 rotations (2 units) while M.S. students must complete at least 1 rotation (1 units). Limited to BME major & minor graduate students.

Grading basis: Regular Grades

Career: Graduate

Course Components: Workshop Required

Repeatable: Course can be repeated for a maximum of 9 units.

Course typically offered:

Main Campus: Fall, Spring

Recommendations and additional information: limited to BME major and minor graduate students.

BME 599: Independent Study (1 - 6 units)

Description: Qualified students working on an individual basis with professors who have agreed to supervise such work. Graduate students doing independent work which cannot be classified as actual research will register for credit under course number 599, 699, or 799.

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Spring, Summer

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

BME 630: Biomedical Optics and Biophotonics (3 units)

Description: [Taught alternate years beginning Fall 2004]. This course covers the basic optical principles, techniques, and instruments used in biomedical research and clinical medicine. It includes in-depth coverage of optical imaging and spectroscopy systems for biomedical research and clinical diagnosis, details of light interaction with tissue, and advanced optical therapeutic instruments and techniques. The course describes commercial devices and instruments as well as new devices and instruments under development for novel applications. This course is intended for advanced graduate students in optical sciences or engineering with a suitable background in optics and imaging.

Grading basis: Regular Grades

Career: Graduate

Course Components: Lecture Required

Equivalent to: BME 630

Also offered as: OPTI 630

Course typically offered:

Main Campus: Fall

Home department: College of Optical Sciences

BME 638: Advanced Medical Imaging (3 units)

Description: Describes the physical principles behind the medical cross-sectional imaging modalities of magnetic resonance imaging (MRI), computed tomography (CT), ultrasound (US), positron emission tomography (PET), and single photon emission computed tomography (SPECT).

Grading basis: Regular Grades

Career: Graduate

Course Components: Lecture Required

Equivalent to: BME 638

Also offered as: OPTI 638

Course typically offered:

Main Campus: Spring

Recommendations and additional information: OPTI 512R, OPTI 604.

Home department: College of Optical Sciences

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

BME 639: Magnetic Resonance Imaging (3 units)

Description: This course covers the physical principles, system design, data encoding and acquisition methods, pulse sequences, image reconstruction algorithms, data analyses and visualization, and biomedical application of magnetic resonance imaging (MRI). Topics ranging from basic principles, to advanced development, to emerging fields of MRI research will be systematically discussed in this course. The goals of this course are 1) helping students acquire in-depth understanding of MRI, 2) guiding students to develop basic skills for performing MRI research, 3) preparing graduate students for performing advanced biomedical imaging research and future career that involves MRI. The students will achieve these goals after successfully completing the following course objectives: attending the lectures and programming workshops, performing research projects and lab activities, implementing simulation and reconstruction computer codes, conducting literature reviews, writing a research report, and delivering oral presentations.

Grading basis: Regular Grades

Career: Graduate

Course Components:	Lecture	Required
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Course typically offered:

Main Campus: Spring

Recommendations and additional information: Basic MRI knowledge at the level of BME 516 or BME 638 is recommended not required. Basic computer programming in a language suitable for image analysis and signal processing (e.g. Matlab, Python, Julia, C, or C++) is recommended.

BME 693A: Clinical/Industrial Internship (1 - 3 units)

Description: Specialized work on an individual basis, consisting of training and practice in actual service in a technical, business, or governmental establishment.

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Independent Study Required

Course typically offered:

Main Campus: Fall, Spring, Summer

BME 696A: Biomedical Engineering Seminar (1 unit)

Description: The development and exchange of scholarly information, usually in a small group setting. The scope of work shall consist of research by course registrants, with the exchange of the results of such research through discussion, reports, and/or papers.

Grading basis: Regular Grades

Career: Graduate

Course Components: Seminar Required

Repeatable: Course can be repeated for a maximum of 6 units.

Course typically offered:

Main Campus: Fall, Spring

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

BME 696C: Biomedical Engineering Student Forum (1 unit)

Description: This course is an opportunity for students to exchange ideas, present research topics, and invite guest speakers

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Seminar Required

Repeatable: Course can be repeated a maximum of 4 times.

Course typically offered:

Main Campus: Fall, Spring

BME 900: Research (1 - 12 units)

Description: Individual research, not related to thesis or dissertation preparation, by graduate student.

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Spring, Summer

BME 909: Master's Report (1 - 12 units)

Description: Individual study or special project or formal report thereof submitted in lieu of thesis for certain master's degrees.

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Spring, Summer

BME 910: Thesis (1 - 12 units)

Description: Research for the master's thesis (whether library research, laboratory or field observation or research, artistic creation, or thesis writing). Maximum total credit permitted varies with the major department.

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Spring, Summer

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

BME 920: Dissertation (1 - 9 units)

Description: Research for the doctoral dissertation (whether library research, laboratory or field observation or research, or dissertation writing).

Grading basis: Alternative Grading: S, P, F

Career: Graduate

Course Components: Independent Study Required

Repeatable: Course can be repeated a maximum of 99 times.

Course typically offered:

Main Campus: Fall, Spring, Summer

-SA represents a Student Abroad & Student Exchange offering

-CC represents a Correspondence Course offering

May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.