

# BIOMEDICAL ENGINEERING- BIOM (BIOM)

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## Courses

### BIOM 100 Overview of Biomedical Engineering Credit: 1 (1-0-0)

**Course Description:** Overview of the field of biomedical engineering with an emphasis on the roles of mechanical, electrical, and chemical/biological engineering principles.

**Prerequisite:** None.

**Restriction:** Must be a: Undergraduate.

**Registration Information:** Sections may be offered: Online. Credit allowed for only one of the following: BIOM 100, BIOM 101, BIOM 109, or BIOM 180A1.

**Term Offered:** Fall.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

### BIOM 101 Introduction to Biomedical Engineering Credits: 3 (3-0-0)

**Course Description:** Basic principles, fundamentals in biomedical engineering including molecular, cellular and physiological principles, major areas such as biomechanics.

**Prerequisite:** None.

**Registration Information:** Credit allowed for only one of the following: BIOM 100, BIOM 101, BIOM 109, or BIOM 180A1. Credit not allowed for both BIOM 101 and BIOM 200.

**Term Offered:** Fall.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

### BIOM 109 Principles of Biomedical Engineering Credit: 1 (1-0-0)

**Course Description:** Fundamental principles of biomedical engineering and commonalities with mechanical, electrical, and chemical/biological engineering. Emphasis on the application of engineering design in a biomedical context. Introduction to industrial and academic career paths.

**Prerequisite:** None.

**Registration Information:** Offered as an online course only. Only offered for high school students who are concurrently enrolled in the complementary in-person course at a participating high school. Credit allowed for only one of the following: BIOM 100, BIOM 101, BIOM 109, or BIOM 180A1.

**Terms Offered:** Fall, Spring.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

### BIOM 200 Fundamentals of Biomedical Engineering Credits: 2 (2-0-0)

**Course Description:** Application of engineering analysis to physiology and biomedical engineering topics.

**Prerequisite:** LIFE 102, may be taken concurrently and MATH 160.

**Restriction:** Must be a: Undergraduate.

**Registration Information:** Sections may be offered: Online. Credit not allowed for both BIOM 101 and BIOM 200.

**Term Offered:** Fall.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

### BIOM 300 Problem-Based Learning Biomedical Engr Lab Credits: 4 (1-4-1)

**Course Description:** Group problem-based learning approach to problems spanning all core areas of biomedical engineering.

**Prerequisite:** (BIOM 200 or CBE 205 and MECH 262, may be taken concurrently) and (MATH 340 or MATH 345).

**Restriction:** Must not be a: Freshman, Sophomore.

**Registration Information:** Junior standing. Must register for lecture, lab, and recitation.

**Term Offered:** Spring.

**Grade Mode:** Traditional.

**Special Course Fee:** Yes.

### BIOM 304 Global Challenges and Collaborations in BME Credits: 3 (3-0-0)

**Course Description:** Foundational elements of cross-cultural competence in the biomedical engineering field, considering social, political, and economic differences in areas such as medical device design, regulation, technology transfer, and ethics.

**Prerequisite:** BIOM 100 or BIOM 101.

**Restrictions:** Must not be a: Freshman. Must be a: Undergraduate.

**Registration Information:** Sophomore standing. Offered as Mixed Face-to-Face. Credit not allowed for both BIOM 304 and BIOM 380A2.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

### BIOM 306 Bioprocess Engineering Credits: 4 (3-2-0)

**Also Offered As:** BTEC 306.

**Course Description:** Material, energy balances; fluid flow, heat exchange, mass transfer; application to operations in food, fermentation, other bioprocess industries.

**Prerequisite:** (CHEM 107 or CHEM 111) and (PH 121 or PH 141).

**Registration Information:** Must register for lecture and laboratory. Credit not allowed for both BIOM 306 and BTEC 306.

**Term Offered:** Spring.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

### BIOM 350A Study Abroad--Ecuador: Prosthetics Credits: Var[1-3] (0-0-0)

**Course Description:** Design and fabricate prosthetics for under-served populations in Ecuador. The experience occurs in Quito, Ecuador in partnership with a local university and Range of Motion Project (ROMP), a non-profit healthcare organization.

**Prerequisite:** None.

**Registration Information:** Credit not allowed for both BIOM 350A and BIOM 382A.

**Term Offered:** Summer.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

### BIOM 350B Study Abroad--Portugal: Biomedical Engineering and Healthcare Credit: 1 (0-0-1)

**Course Description:** Intercultural exchange in Portugal, with a focus on becoming familiar with pharmaceutical production, regulatory affairs and quality control, product development, and practices in biotechnology and biomedical engineering. Visits to historic and cultural sites and pharmaceutical, biomedical, biotechnology, and healthcare facilities.

**Prerequisite:** None.

**Term Offered:** Spring.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

**BIOM 350C Study Abroad--Ireland: Biomedical Engineering and Healthcare Credit: 1 (0-0-1)**

**Course Description:** Intercultural exchange in Ireland, focusing on becoming familiar with the pharmaceutical/medical device industry, regulatory affairs and quality control, product development, the Irish healthcare system, and practices in biotechnology and biomedical engineering. Visits to historic and cultural sites and pharmaceutical, biomedical, biotechnology, and healthcare facilities.

**Prerequisite:** None.

**Term Offered:** Spring.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

**BIOM 403 Intro to Optical Techniques in Biomedical Eng Credits: 3 (3-0-0)**

**Also Offered As:** ECE 403.

**Course Description:** Engineering design principles of optical characterization techniques for biomedical systems, including optical spectroscopy and microscopy of biomolecules and tissues.

**Prerequisite:** CHEM 111 and PH 142 with a minimum grade of C.

**Restriction:** Must not be a: Freshman, Sophomore.

**Registration Information:** Junior standing. Sections may be offered: Online. Credit allowed for only one of the following: BIOM 403, BIOM 481A3, ECE 403, or ECE 481A3.

**Term Offered:** Fall (even years).

**Grade Mode:** Traditional.

**Special Course Fee:** No.

**BIOM 421 Transport Phenomena in Biomedical Engineering Credits: 3 (3-0-0)**

**Course Description:** Engineering models of active and passive mechanisms of momentum. Heat and mass transport in mammalian cells, tissues, and organ systems.

**Prerequisite:** (BMS 300) and (CBE 332 or MECH 344).

**Registration Information:** Sections may be offered: Online. Credit not allowed for both BIOM 330 and BIOM 421.

**Term Offered:** Fall.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

**BIOM 422 Quantitative Systems and Synthetic Biology Credits: 3 (3-0-0)**

**Course Description:** In-depth analysis of the quantitative systems approach to biology and biological engineering at the molecular and cellular scales.

**Prerequisite:** CBE 320.

**Registration Information:** Sections may be offered: Online. Credit not allowed for both BIOM 400 and BIOM 422.

**Term Offered:** Fall.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

**BIOM 431 Biomedical Signal and Image Processing Credits: 3 (3-0-0)**

**Also Offered As:** ECE 431.

**Course Description:** Principles, features and mathematical processing of biomedical signals and images including interference and noise filtering and feature enhancement.

**Prerequisite:** (ECE 303 with a minimum grade of C or STAT 303 with a minimum grade of C) and (ECE 311 with a minimum grade of C and PH 142 with a minimum grade of C).

**Registration Information:** Sections may be offered: Online. Credit not allowed for both BIOM 431 and ECE 431.

**Term Offered:** Spring.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

**BIOM 440 Computational Statistics For Bioengineering Credits: 3 (2-2-0)**

**Also Offered As:** CBE 440.

**Course Description:** Application of computational methods that integrate differential equations and statistical analyses with concepts from cell biology, transport phenomena, and systems biology to analyze experimental data and infer predictive models for natural and synthetic processes in biological and biomedical engineering. Analysis of datasets arising in biological and biomedical engineering, including proteomics, optical microscopy, and RNA sequencing.

**Prerequisite:** (BIOM 422 and CBE 320) and (CBE 340 or STAT 315).

**Registration Information:** Must register for lecture and laboratory. Credit allowed for only one of the following: BIOM 440, BIOM 480A5, CBE 440, or CBE 480A5.

**Term Offered:** Spring.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

**BIOM 441 Biomechanics and Biomaterials Credits: 3 (3-0-0)**

**Course Description:** Principles of biomechanics, biofluids, and biomaterials.

**Prerequisite:** (BMS 300, may be taken concurrently and CIVE 360 and MECH 324, may be taken concurrently) and (MECH 331, may be taken concurrently or MECH 331B, may be taken concurrently and MECH 331A, may be taken concurrently) and (MECH 342, may be taken concurrently).

**Registration Information:** Sections may be offered: Online.

**Term Offered:** Fall.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

**BIOM 476 Biomedical Engineering Clinical Practicum Credits: Var[1-3] (0-0-0)**

**Course Description:** Biomedical lab work or research project in hospital, clinical, or other medical environment.

**Prerequisite:** BMS 300.

**Restrictions:** Must not be a: Freshman, Sophomore. Must be a: Undergraduate.

**Registration Information:** Written consent of department chair. Written consent of instructor.

**Terms Offered:** Fall, Spring, Summer.

**Grade Mode:** Instructor Option.

**Special Course Fee:** No.

**BIOM 486A Biomedical Design Practicum: Capstone Design I Credits: 4 (0-0-10)**

**Course Description:**

**Prerequisite:** (BIOM 300) and (BIOM 422 and CBE 320 and CBE 442 or ECE 342 and BIOM 431 and ECE 311 and ECE 332 or MECH 307 and BIOM 441 and MECH 325).

**Restrictions:** Must not be a: Freshman, Sophomore, Junior. Must be a: Undergraduate.

**Registration Information:** Senior standing. Enrollment in biomedical engineering major.

**Term Offered:** Fall.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

**BIOM 486B Biomedical Design Practicum: Capstone Design II Credits: 4 (0-0-10)****Course Description:**

**Prerequisite:** (BIOM 486A) and (CBE 451 or ECE 312 or MECH 325 and MECH 344 or PH 353).

**Restrictions:** Must not be a: Freshman, Sophomore, Junior. Must be a: Undergraduate.

**Registration Information:** Senior standing. Enrollment in biomedical engineering major.

**Term Offered:** Spring.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

**BIOM 495 Independent Study Credits: Var[1-6] (0-0-0)****Course Description:**

**Prerequisite:** None.

**Terms Offered:** Fall, Spring, Summer.

**Grade Mode:** Instructor Option.

**Special Course Fee:** No.

**BIOM 504 Fundamentals of Biochemical Engineering Credits: 3 (3-0-0)**

**Also Offered As:** CBE 504.

**Course Description:** Application of chemical engineering principles to enzyme kinetics, fermentation and cell culture, product purification, and bioprocess design.

**Prerequisite:** CBE 205.

**Restriction:** Must not be a: Freshman, Sophomore, Junior.

**Registration Information:** Senior standing. Sections may be offered: Online. Credit not allowed for both BIOM 504 and CBE 504.

**Term Offered:** Fall.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

**BIOM 517 Advanced Optical Imaging Credits: 3 (3-0-0)**

**Also Offered As:** ECE 517.

**Course Description:** Engineering design principles of advanced optical imaging techniques and image formation theory.

**Prerequisite:** ECE 342 with a minimum grade of C or MATH 340 with a minimum grade of C or MATH 345 with a minimum grade of C.

**Restriction:** Must not be a: Freshman, Sophomore.

**Registration Information:** Junior standing. Sections may be offered: Online. Credit allowed for only one of the following: BIOM 517, BIOM 581B7, ECE 517 or ECE 581B7.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

**BIOM 518 Biophotonics Credits: 3 (3-0-0)**

**Also Offered As:** ECE 518.

**Course Description:** Engineering design principles of optical instrumentation for medical diagnostics. Light propagation and imaging in biological tissues.

**Prerequisite:** ECE 342 with a minimum grade of C or ECE 457 with a minimum grade of C or MATH 340 with a minimum grade of C or MATH 345 with a minimum grade of C.

**Restriction:** Must not be a: Freshman, Sophomore.

**Registration Information:** Junior standing. Sections may be offered: Online. Credit allowed for only one of the following: BIOM 518, BIOM 581A9, ECE 518 or ECE 581A9.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

**BIOM 522 Bioseparation Processes Credits: 3 (3-0-0)**

**Also Offered As:** CBE 522.

**Course Description:** Analysis of processes to recover and purify fermentation products.

**Prerequisite:** CBE 331.

**Registration Information:** Sections may be offered: Online. Credit allowed for only one of the following: BIOM 522, CBE 522, or CBE 581A2.

**Term Offered:** Fall.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

**BIOM 525 Cell and Tissue Engineering Credits: 3 (3-0-0)**

**Also Offered As:** MECH 525.

**Course Description:** Cell and tissue engineering concepts and techniques with emphasis on cellular response, cell adhesion kinetics, and tissue engineering design.

**Prerequisite:** BC 351 or BMS 300 or BMS 500 or BZ 310 or NB 501.

**Registration Information:** Credit allowed for only one of the following: BIOM 525, CBE 525, MECH 525. Sections may be offered: Online.

**Term Offered:** Spring. (even years).

**Grade Mode:** Traditional.

**Special Course Fee:** No.

**BIOM 526 Biological Physics Credits: 3 (3-0-0)**

**Also Offered As:** ECE 526.

**Course Description:** Mathematical and physical modeling of biological systems. Mass transport in cellular environments. Electrical/mechanical properties of biomolecules.

**Prerequisite:** (MATH 340 or MATH 345) and (PH 122 or PH 142).

**Restriction:** Must not be a: Freshman, Sophomore.

**Registration Information:** Junior standing. Credit not allowed for both BIOM 526 and ECE 526. Sections may be offered: Online.

**Term Offered:** Fall (odd years).

**Grade Mode:** Traditional.

**Special Course Fee:** No.

**BIOM 527A Biosensing: Cells as Circuits Credit: 1 (1-0-0)**

**Also Offered As:** ECE 527A.

**Course Description:** Treatment of biological cells as circuits and their electrical time-dependent function and frequency-dependent impedance. Topics include the Hodgkin–Huxley circuit model, diffusion equation, and modeling action potential propagation.

**Prerequisite:** (BIOM 101 or LIFE 102) and (CHEM 111) and (MATH 340 or MATH 345) and (PH 142).

**Registration Information:** Junior standing. This is a partial semester course. Credit allowed for only one of the following: BIOM 527A, BIOM 581B1, ECE 527A, or ECE 581B1.

**Term Offered:** Fall (odd years).

**Grade Mode:** Traditional.

**Special Course Fee:** No.

**BIOM 527B Biosensing: Signal and Noise in Biosensors Credit: 1 (1-0-0)**

**Also Offered As:** ECE 527B.

**Course Description:** Quantitative treatment of concepts of noise, interference and signal including noise types and spectra, filtering, and limitations imposed by noise. Example applications to Biosensors.

**Prerequisite:** (MATH 340, may be taken concurrently or MATH 345, may be taken concurrently) and (PH 142).

**Registration Information:** Junior standing. This is a partial semester course. Credit allowed for only one of the following: BIOM 527B, BIOM 581B2, ECE 527B, or ECE 581B2.

**Term Offered:** Spring (even years).

**Grade Mode:** Traditional.

**Special Course Fee:** No.

**BIOM 527C Biosensing: Sensor Circuit Fundamentals Credit: 1 (1-0-0)****Also Offered As:** ECE 527C.**Course Description:** Introduction to circuit concepts used in sensors, including review of basic circuit elements of resistors, capacitors, and MOS (Metal-Oxide-Semiconductor transistors) elements. Fundamentals of the application of MOS circuits for signal conditioning and amplification and how sensor's backend signal processing is carried out after the sensor signal transduction stage.**Prerequisite:** (BIOM 101 or LIFE 102) and (MATH 340, may be taken concurrently or MATH 345, may be taken concurrently) and (PH 142).**Registration Information:** Junior standing. This is a partial semester course. Credit allowed for only one of the following: BIOM 527C, BIOM 581B3, ECE 527C, or ECE 581B3.**Term Offered:** Fall (odd years).**Grade Mode:** Traditional.**Special Course Fee:** No.**BIOM 527D Biosensing: Electrochemical Sensors Credit: 1 (1-0-0)****Also Offered As:** ECE 527D.**Course Description:** Introduction to the electrochemistry, and applications of electrochemical methods, used for detection of certain classes of chemicals and molecules.**Prerequisite:** (BIOM 101 or LIFE 102) and (CHEM 111) and (MATH 255 or MATH 261) and (PH 142).**Registration Information:** Junior standing. This is a partial semester course. Credit allowed for only one of the following: BIOM 527D, BIOM 581B5, ECE 527D, or ECE 581B5.**Term Offered:** Fall (odd years).**Grade Mode:** Traditional.**Special Course Fee:** No.**BIOM 527E Biosensing: Affinity Sensors Credit: 1 (1-0-0)****Also Offered As:** ECE 527E.**Course Description:** Fundamentals of affinity sensor application and design, including optical and electrical approaches and technologies.**Prerequisite:** (BIOM 101 or LIFE 102) and (CHEM 111) and (MATH 340, may be taken concurrently or MATH 345, may be taken concurrently) and (PH 142).**Registration Information:** Junior standing. This is a partial semester course. Credit allowed for only one of the following: BIOM 527E, BIOM 581B4, ECE 527E, or ECE 581B4.**Term Offered:** Spring (even years).**Grade Mode:** Traditional.**Special Course Fee:** No.**BIOM 527F Biosensing: Biophotonic Sensors Using Refractive Index Credit: 1 (1-0-0)****Also Offered As:** ECE 527F.**Course Description:** Operating principles of optical biosensors based on changes in refractive index, such as thin films, ring-resonators, Mach-Zehnder interferometers, and other evanescent wave sensors. Basic supporting optical concepts, including thin-film interference, optical waveguides and evanescent waves.**Prerequisite:** (BIOM 527F or ECE 527F) and (MATH 340, may be taken concurrently or MATH 345, may be taken concurrently) and (PH 142).**Registration Information:** Junior standing. This is a partial semester course. Credit allowed for only one of the following: BIOM 527F, BIOM 581B6, ECE 527F, or ECE 581B6.**Term Offered:** Spring (even years).**Grade Mode:** Traditional.**Special Course Fee:** No.**BIOM 531 Materials Engineering Credits: 3 (3-0-0)****Also Offered As:** MECH 531.**Course Description:** Selection of structural engineering materials by properties, processing, and economics; materials for biomedical and biotechnology applications.**Prerequisite:** MECH 331 or MECH 331A and MECH 331B or MECH 431.**Registration Information:** Credit not allowed for both BIOM 531 and MECH 531. Sections may be offered: Online.**Term Offered:** Spring.**Grade Mode:** Traditional.**Special Course Fee:** No.**BIOM 532 Materials Issues in Mechanical Design Credits: 3 (3-0-0)****Also Offered As:** MECH 532.**Course Description:** Failure mechanisms from materials viewpoint with emphasis on use in design. Fracture, creep, fatigue, and corrosion.**Prerequisite:** MECH 331 or MECH 331A and MECH 331B.**Registration Information:** Credit not allowed for both BIOM 532 and MECH 532. Sections may be offered: Online.**Term Offered:** Fall.**Grade Mode:** Traditional.**Special Course Fee:** No.**BIOM 533 Biomolecular Tools for Engineers Credits: 3 (2-3-0)****Also Offered As:** CIVE 533.**Course Description:** Theoretical and practical aspects of biomolecular laboratory tools—PCR, cloning, sequencing, single-molecule optical techniques and live-cell imaging.**Prerequisite:** BMS 300 or MIP 300.**Registration Information:** Must register for lecture and laboratory. Credit not allowed for BIOM 533, CIVE 533 and ECE 533.**Term Offered:** Fall.**Grade Mode:** Traditional.**Special Course Fee:** Yes.**BIOM 537 Biomedical Signal Processing Credits: 3 (3-0-0)****Also Offered As:** ECE 537.**Course Description:** Modeling and classification of biosignals (e.g. EEG, ECG, EMG), covering adaptive filtering, wavelets, support vector machines, neural networks, and handling problems with overfitting of noisy data.**Prerequisite:** ECE 303 or ECE 311 or MATH 340 or STAT 303.**Registration Information:** Sections may be offered: Online. Credit not allowed for both BIOM 537 and ECE 537.**Grade Mode:** Traditional.**Special Course Fee:** No.

**BIOM 559 Machine Learning in Imaging and Spectroscopy Credits: 3 (3-0-0)****Also Offered As:** ECE 559.**Course Description:** Investigate and critique applications of current techniques in biomedical imaging/spectroscopy such as convolutional networks to problems such as deconvolution, computed tomography, phase retrieval, hyperspectral unmixing, and learn how to apply these methods to datasets of their own. A special emphasis on biomedical imaging technologies and applications such as phase contrast microscopy, low-dose x-ray computed tomography, sparse fast magnetic resonance imaging, etc.**Prerequisite:** (ECE 312 with a minimum grade of C or ECE 457) and (BIOM 403, may be taken concurrently or ECE 403, may be taken concurrently or ECE 441, may be taken concurrently or ECE 504) and (ECE 303 with a minimum grade of C or STAT 303 with a minimum grade of C or ECE 431 or BIOM 431) and (CS 150B with a minimum grade of C or CS 152 with a minimum grade of C).**Restriction:** Must not be a: Freshman, Sophomore.**Registration Information:** Junior standing. Sections may be offered: Online. Credit allowed for only one of the following: BIOM 559, BIOM 580C7, ECE 559, or ECE 580C7.**Term Offered:** Fall (even years).**Grade Mode:** Traditional.**Special Course Fee:** No.**BIOM 570 Bioengineering Credits: 3 (3-0-0)****Also Offered As:** MECH 570.**Course Description:** Physiological and medical systems analysis using engineering methods including mechanics, fluid dynamics, control electronics, and signal processing.**Prerequisite:** CBE 332 or ECE 311 or MECH 331A.**Restriction:** Must not be a: Freshman, Sophomore, Junior.**Registration Information:** Sections may be offered: Online. Credit not allowed for both BIOM 570 and MECH 570.**Term Offered:** Fall.**Grade Mode:** Traditional.**Special Course Fee:** No.**BIOM 572 Regenerative Bioengineering with Stem Cells Credits: 3 (3-0-0)****Also Offered As:** MECH 572.**Course Description:** Current status and future direction of bioengineering and regenerative technologies with stem cells. Topics include tissue-specific applications of pluripotent stem cells and multipotent adult stem cells, genetic and epigenetic engineering, organoids, and manufacturing, including scale-up, sorting and preservation.**Prerequisite:** BC 351 or BMS 300 or BZ 310.**Registration Information:** Sections may be offered: Online. Credit allowed for only one of the following: BIOM 572, BIOM 580A9, MECH 572, or MECH 580A9.**Term Offered:** Spring (even years).**Grade Mode:** Traditional.**Special Course Fee:** No.**BIOM 573 Structure and Function of Biomaterials Credits: 3 (3-0-0)****Also Offered As:** MECH 573.**Course Description:** Structure-function relationships of natural biomaterials; application to analysis of biomimetic materials and biomaterials used in medical devices.**Prerequisite:** MECH 331 or MECH 331A and MECH 331B.**Registration Information:** Sections may be offered: Online. Credit not allowed for both BIOM 573 and MECH 573.**Term Offered:** Spring.**Grade Mode:** Traditional.**Special Course Fee:** No.**BIOM 574 Bio-Inspired Surfaces Credits: 3 (3-0-0)****Also Offered As:** MECH 574.**Course Description:** Analysis of surface functionalities of various biological species; identification of design principles.**Prerequisite:** (CHEM 111 or CHEM 120) and (MECH 342).**Registration Information:** Sections may be offered: Online. Credit not allowed for both BIOM 574 and MECH 574.**Term Offered:** Spring.**Grade Mode:** Traditional.**Special Course Fee:** No.**BIOM 576 Quantitative Systems Physiology Credits: 4 (4-0-0)****Also Offered As:** MECH 576.**Course Description:** Quantitative, model-oriented approach to cellular and systems physiology with design examples from biomedical engineering.**Prerequisite:** BMS 300 and CHEM 113 and MATH 340 and PH 142.**Registration Information:** Credit not allowed for both BIOM 576 and MECH 576. Sections may be offered: Online.**Term Offered:** Spring.**Grade Mode:** Traditional.**Special Course Fee:** No.**BIOM 578 Musculoskeletal Biosolid Mechanics Credits: 3 (3-0-0)****Also Offered As:** MECH 578.**Course Description:** Application of engineering concepts to quantify the mechanical behavior of load-bearing biological tissues and orthopaedic implant performance.**Prerequisite:** CIVE 360.**Restriction:** Must be a: Graduate.**Registration Information:** Graduate standing. Sections may be offered: Online. Credit not allowed for both BIOM 578 and MECH 578.**Term Offered:** Fall.**Grade Mode:** Traditional.**Special Course Fee:** No.**BIOM 579 Cardiovascular Biomechanics Credits: 3 (3-0-0)****Also Offered As:** MECH 579.**Course Description:** Bio-mechanical principles and approaches applied in cardiovascular research.**Prerequisite:** MATH 340 and PH 142.**Restriction:** Must be a: Graduate.**Registration Information:** Graduate students only. Sections may be offered: Online. Credit allowed for only one of the following: BIOM 579, BIOM 581A8, MECH 579, or MECH 581A8.**Term Offered:** Fall (odd years).**Grade Mode:** Traditional.**Special Course Fee:** No.

**BIOM 586A Biomedical Clinical Practicum Credits: 2 (1-2-0)**

**Course Description:** Graduate-level activity that includes biomedical research or design of a new medical device, as well as essential elements of professional development.

**Prerequisite:** (BMS 300 or BMS 500) and (BIOM 570 or MECH 570).

**Registration Information:** Must register for lecture and laboratory.

**Terms Offered:** Fall, Spring, Summer.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

**BIOM 586B Biomedical Clinical Practicum Credits: 4 (1-6-0)**

**Course Description:** Graduate-level activity, such as biomedical research or design of a new medical device, for exposure to the hospital/clinical environment.

**Prerequisite:** (BMS 300 or BMS 500) and (BIOM 570 or MECH 570).

**Registration Information:** Must register for lecture and laboratory.

**Terms Offered:** Fall, Spring, Summer.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

**BIOM 592 Seminar Credits: Var[1-3] (0-0-0)**

**Course Description:** Student and research faculty presentations, guest and invited extramural speakers.

**Prerequisite:** None.

**Registration Information:** Sections may be offered: Online.

**Terms Offered:** Fall, Spring, Summer.

**Grade Mode:** Instructor Option.

**Special Course Fee:** No.

**BIOM 671 Orthopedic Tissue Biomechanics Credits: 3 (3-0-0)**

**Also Offered As:** MECH 671.

**Course Description:** Linear elastic, finite deformation, and viscoelastic theories applied to the mechanical behavior of orthopedic tissues (bone, tendon, cartilage).

**Prerequisite:** CIVE 560.

**Restriction:** Must be a: Graduate, Professional.

**Registration Information:** Credit not allowed for both BIOM 671 and MECH 671.

**Term Offered:** Fall (odd years).

**Grade Mode:** Traditional.

**Special Course Fee:** No.

**BIOM 684 Supervised College Teaching Credits: Var[1-18] (0-0-0)**

**Course Description:**

**Prerequisite:** None.

**Restriction:** Must be a: Graduate, Professional.

**Registration Information:** Maximum of 6 credits allowed in course; may not be used to satisfy degree requirements requiring bioengineering courses.

**Terms Offered:** Fall, Spring, Summer.

**Grade Mode:** Instructor Option.

**Special Course Fee:** No.

**BIOM 695 Independent Study Credits: Var[1-18] (0-0-0)**

**Course Description:**

**Prerequisite:** None.

**Restriction:** Must be a: Graduate, Professional.

**Terms Offered:** Fall, Spring, Summer.

**Grade Mode:** Instructor Option.

**Special Course Fee:** No.

**BIOM 699 Thesis Credits: Var[1-18] (0-0-0)**

**Course Description:**

**Prerequisite:** None.

**Restriction:** Must be a: Graduate, Professional.

**Terms Offered:** Fall, Spring, Summer.

**Grade Mode:** Instructor Option.

**Special Course Fee:** No.

**BIOM 750 Grant Proposal Writing and Reviewing Credit: 1 (1-0-0)**

**Course Description:** Preparation and review of applications for fellowships and grants.

**Prerequisite:** None.

**Restriction:** Must be a: Graduate, Professional.

**Registration Information:** Written consent of instructor.

**Term Offered:** Fall.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

**BIOM 784 Supervised College Teaching Credits: Var[1-6] (0-0-0)**

**Course Description:**

**Prerequisite:** None.

**Restriction:** Must be a: Graduate, Professional.

**Terms Offered:** Fall, Spring, Summer.

**Grade Mode:** Instructor Option.

**Special Course Fee:** No.

**BIOM 786 Practicum-Laboratory Rotations Credits: Var[1-18] (0-0-0)**

**Course Description:**

**Prerequisite:** None.

**Restriction:** Must be a: Graduate, Professional.

**Terms Offered:** Fall, Spring, Summer.

**Grade Mode:** Instructor Option.

**Special Course Fee:** No.

**BIOM 795 Independent Study Credits: Var[1-6] (0-0-0)**

**Course Description:**

**Prerequisite:** None.

**Restriction:** Must be a: Graduate, Professional.

**Terms Offered:** Fall, Spring, Summer.

**Grade Mode:** Instructor Option.

**Special Course Fee:** No.

**BIOM 798 Research-Laboratory Rotations Credits: Var[1-6] (0-0-0)**

**Course Description:** Doctoral laboratory rotation.

**Prerequisite:** None.

**Restriction:** Must be a: Graduate, Professional.

**Terms Offered:** Fall, Spring, Summer.

**Grade Mode:** Instructor Option.

**Special Course Fee:** No.

**BIOM 799 Dissertation Credits: Var[1-18] (0-0-0)**

**Course Description:**

**Prerequisite:** None.

**Restriction:** Must be a: Graduate, Professional.

**Terms Offered:** Fall, Spring, Summer.

**Grade Mode:** Instructor Option.

**Special Course Fee:** No.