BIOMEDICAL ENGINEERING (BME)

Biomedical Engineering Courses

BME 101 Fundamentals of Biomedical Engineering
3 cr. Undergraduate.
A system approach to physiology, cell physiology and transport, major organ systems,cardiovascular system, biomedical signal processing, biomechanics, biomedical engineering design.
Prerequisites: none.
Last Taught: Spring 2025, Fall 2024, Spring 2024, Fall 2023.
Current Offerings: https://catalog.uwm.edu/course-search/

BME 296 Fundamentals of Biomaterials
4 cr. Undergraduate.
Fundamentals of biomaterials including ceramics, metals, polymers, and natural biomaterials; Biological responses to implants; clinical perspectives; designing new biomaterials; tissue engineering. Laboratory experiments.
Prerequisites: BIO SCI 203(P).
Last Taught: Spring 2025, Fall 2024, Spring 2024, Fall 2023.
Current Offerings: https://catalog.uwm.edu/course-search/

BME 301 Fundamentals of Biomaterials
3 cr. Undergraduate.
Fundamentals of biomaterials including ceramics, metals, polymers. and natural biomaterials; Biological responses to implants; clinical perspectives; designing new biomaterials; tissue engineering.
Prerequisites: BIO SCI 203(P) and MATLENG 201(P).
Course Rules: Previously BME 385.
Last Taught: Fall 2022, Spring 2022, Fall 2021, Spring 2021.
Current Offerings: https://catalog.uwm.edu/course-search/

BME 302 Analysis and Modeling of Dynamic Systems
4 cr. Undergraduate.
Modeling and analysis of mechanical, electrical, electromechanical, fluid, and physiological systems; laboratory experiments.
Prerequisites: EAS 210(P) or MECHENG 101(P), ELECENG 234(P), and PHYSICS 210(P).
Last Taught: Spring 2025, Fall 2024, Spring 2024, Fall 2023.
Current Offerings: https://catalog.uwm.edu/course-search/

BME 305 Introduction to Engineering Biomechanics
3 cr. Undergraduate.
Introduction to engineering biomechanics principles applied to the musculoskeletal system and human body for analysis of human movement.
Prerequisites: BIO SCI 203(P) and BME 302(P).
Last Taught: Fall 2022, Spring 2022, Fall 2021, Spring 2021.
Current Offerings: https://catalog.uwm.edu/course-search/

BME 306 Introduction to Engineering Biomechanics
4 cr. Undergraduate.
Introduction to engineering biomechanics principles applied to the musculoskeletal system and human body for analysis of human movement, laboratory experiments.
Prerequisites: BIO SCI 203(P), BME 296(P) or BME 301(P) and BME 302(P).
Last Taught: Spring 2025, Fall 2024, Spring 2024, Fall 2023.
Current Offerings: https://catalog.uwm.edu/course-search/

BME 310 Biomedical Signals and Systems
3 cr. Undergraduate.
Introduction to principles of biosignals and system of the human body. Time-domain analysis of Biosignals, Biosensing, Bio-electric signals, Electrocardiogram (ECG), muscle electromyogram (EMG), EEG, etc.
Prerequisites: BME 302(P).
Last Taught: Spring 2025, Fall 2024, Spring 2024, Fall 2023.
Current Offerings: https://catalog.uwm.edu/course-search/

BME 320 Engineering of Biomedical Devices I
4 cr. Undergraduate.
Physiological and biomechatronic systems, sensors and actuators, signal processing, hearing aid and implants. Laboratory experiments sessions included.
Prerequisites: junior standing, BME 101(P) and concurrent enrollment or previous completion of BME 302.
Last Taught: Spring 2025, Fall 2024, Spring 2024, Fall 2023.
Current Offerings: https://catalog.uwm.edu/course-search/

BME 325 Engineering of Biomedical Devices II
3 cr. Undergraduate.
Feedback and control systems, visual prostheses, heart assist and replacement devices, respiratory aids, active and passive prosthetic limbs.
Prerequisites: junior standing, BIO SCI 203(P), and BME 320(P).
Last Taught: Spring 2025, Fall 2024, Spring 2024, Fall 2023.
Current Offerings: https://catalog.uwm.edu/course-search/

BME 437 Introduction to Biomedical Imaging
3 cr. Undergraduate/Graduate.
Biomedical imaging modalities and underlying principles: X-radiography, computerized tomography, Radon transforms; image reconstruction techniques; ultrasonic imaging; nuclear medicine; magnetic resonance imaging; experimental techniques.
Prerequisites: senior standing; completion of BME 310(P) or ELECENG 310(P).
Course Rules: BME 437/ELECENG 437 are jointly offered and count as repeats of one another.
Current Offerings: https://catalog.uwm.edu/course-search/

BME 437G Introduction to Biomedical Imaging
3 cr. Undergraduate/Graduate.
Biomedical imaging modalities and underlying principles: X-radiography, computerized tomography, Radon transforms; image reconstruction techniques; ultrasonic imaging; nuclear medicine; magnetic resonance imaging; experimental techniques.
Prerequisites: senior standing; completion of BME 310(P) or ELECENG 310(P).
Course Rules: BME 437/ELECENG 437 are jointly offered and count as repeats of one another.
Current Offerings: https://catalog.uwm.edu/course-search/

BME 439 Introduction to Biomedical Optics
3 cr. Undergraduate/Graduate.
Tissue Optical Properties, Light Transport, Fourier Transforms in Spatial Domain, Wave theory, Spectroscopy, Optical imaging, Laser-Tissue interaction, Photoconversion, Photodynamic Therapy, Microscopy, Fluorescence imaging, and OCT.
Prerequisites: senior standing; ELECENG 310(P) or BME 310 (P).
Course Rules: BME 439/ELECENG 439 are jointly offered and count as repeats of each other.
Current Offerings: https://catalog.uwm.edu/course-search/

BME 439G Introduction to Biomedical Optics
3 cr. Undergraduate/Graduate.
Tissue Optical Properties, Light Transport, Fourier Transforms in Spatial Domain, Wave theory, Spectroscopy, Optical imaging, Laser-Tissue interaction, Photoconversion, Photodynamic Therapy, Microscopy, Fluorescence imaging, and OCT.
Prerequisites: senior standing; ELECENG 310(P) or BME 310 (P).
Course Rules: BME 439/ELECENG 439 are jointly offered and count as repeats of each other.
Current Offerings: https://catalog.uwm.edu/course-search/

BME 495 Biomedical Instrumentation Laboratory
3 cr. Undergraduate.
Characteristics of measurement systems, experiment planning, sensor and system calibration, measurement of basic quantities, first and second order systems, data acquisition and processing, experimental projects.
Prerequisites: BME 305(C) or BME 306(C), BME 310(C), and BME 325(C).
Last Taught: Spring 2025, Fall 2024, Spring 2024, Fall 2023.
Current Offerings: https://catalog.uwm.edu/course-search/

BME 585 Advanced Biomaterials
3 cr. Undergraduate/Graduate.
Theory and application of advanced biomaterials including cardiovascular devices, orthopedic applications, drug delivery systems, biosensors, and tissue engineering.
Prerequisites: senior standing; MATLENG 385(P) or BME 385(P); or consent of instructor.
Course Rules: BME 585 and MATLENG 585 are jointly offered and count as repeats of one another.
Last Taught: Spring 2020.
Current Offerings: https://catalog.uwm.edu/course-search/

BME 585G Advanced Biomaterials
3 cr. Undergraduate/Graduate.
Theory and application of advanced biomaterials including cardiovascular devices, orthopedic applications, drug delivery systems, biosensors, and tissue engineering.
Prerequisites: senior standing; MATLENG 385(P) or BME 385(P); or consent of instructor.
Course Rules: BME 585 and MATLENG 585 are jointly offered and count as repeats of one another.
Last Taught: Spring 2020.
Current Offerings: https://catalog.uwm.edu/course-search/

BME 595 Capstone Design Project
4 cr. Undergraduate.
Introduction to design process and ethics; Students work in teams to plan, design, and test in a simulated real-world environment; formal oral and written reports.
Prerequisites: senior standing; BME 495(P).
Last Taught: Spring 2025, Fall 2024, Spring 2024, Fall 2023.
Current Offerings: https://catalog.uwm.edu/course-search/

BME 599 Senior Thesis
1-3 cr. Undergraduate.
Independent research under the direction of a faculty member; submission of a written thesis required. 3 cr total required.
Prerequisites: senior standing; consent of instructor.
Course Rules: May be retaken to max of 3 cr.
Last Taught: Summer 2023, Fall 2022, Fall 2020, Spring 2020.
Current Offerings: https://catalog.uwm.edu/course-search/

BME 690 Topics in Biomedical Engineering:
3 cr. Undergraduate/Graduate.
Specific topics, credits, and any additional prerequisites will be announced in the Schedule of Classes each time the course is offered.
Prerequisites: junior standing.
Course Rules: May be retaken with change in topic to a max of 9 cr.
Last Taught: Spring 2025, Fall 2024.
Current Offerings: https://catalog.uwm.edu/course-search/

BME 690G Topics in Biomedical Engineering:
3 cr. Undergraduate/Graduate.
Specific topics, credits, and any additional prerequisites will be announced in the Schedule of Classes each time the course is offered.
Prerequisites: junior standing.
Course Rules: May be retaken with change in topic to a max of 9 cr.
Last Taught: Spring 2025, Fall 2024.
Current Offerings: https://catalog.uwm.edu/course-search/

BME 699 Independent Study
1-3 cr. Undergraduate/Graduate.
In consultation with a faculty advisor, student will develop the study plan on a topic related to biomedical engineering.
Prerequisites: junior standing, consent of instructor and CEAS Associate Dean.
Course Rules: May be retaken to 6 cr max.
Last Taught: Summer 2025, Fall 2024.
Current Offerings: https://catalog.uwm.edu/course-search/

BME 699G Independent Study
1-3 cr. Undergraduate/Graduate.
In consultation with a faculty advisor, student will develop the study plan on a topic related to biomedical engineering.
Prerequisites: junior standing, consent of instructor and CEAS Associate Dean.
Course Rules: May be retaken to 6 cr max.
Last Taught: Summer 2025, Fall 2024.
Current Offerings: https://catalog.uwm.edu/course-search/

BME 720 Machine Perception
3 cr. Graduate.
Fundamentals of computer vision and graphics, fundamentals of human-machine interaction, object sensing and tracking, virtual/augmented reality, automatic human behavior analysis, and biomedical applications.
Prerequisites: grad st.
Current Offerings: https://catalog.uwm.edu/course-search/

BME 733 Sensors and Systems
3 cr. Graduate.
Physical principles and working of sensors, interfacing, and sensor networks.
Prerequisites: graduate standing and ELECENG 305(P) or consent of instructor.
Course Rules: BME 733, ELECENG 733, and MECHENG 733 are jointly offered and count as repeats of one another.
Last Taught: Fall 2024, Fall 2023, Fall 2022, Fall 2021.
Current Offerings: https://catalog.uwm.edu/course-search/

BME 888 Candidates for Degree
0 cr. Graduate.
Available for graduate students who must meet minimum credit load requirement.
Prerequisites: graduate standing.
Course Rules: Fee for 1 cr assessed; unit does not count towards credit load for Fin Aid. Repeatable. Satisfactory/Unsatisfactory only.
Current Offerings: https://catalog.uwm.edu/course-search/

BME 890 Special Topics:
3 cr. Graduate.
Lectures on special topics in biomedical engineering. Variable content course. Specific topics and any additional prerequisites will be announced in the schedule of classes each time the course is offered.
Prerequisites: graduate standing.
Course Rules: May be repeated with change in topic to 9 cr max.
Last Taught: Spring 2025, Spring 2024, Spring 2023, Fall 2020.
Current Offerings: https://catalog.uwm.edu/course-search/

BME 990 Masters Thesis
1-9 cr. Graduate.
Masters thesis research.
Prerequisites: graduate standing and consent of instructor.
Course Rules: Repeatable to 36 cr max.
Last Taught: Summer 2025, Spring 2025, Fall 2024, Spring 2024.
Current Offerings: https://catalog.uwm.edu/course-search/

BME 998 Doctoral Thesis
1-12 cr. Graduate.
Doctoral thesis is a part of degree requirements.
Prerequisites: grad st; cons instr & grad prog committee.
Course Rules: Re-takeable up to 99 credits.
Last Taught: Spring 2025, Fall 2024, Spring 2024, Fall 2023.
Current Offerings: https://catalog.uwm.edu/course-search/

BME 999 Advanced Independent Study
1-3 cr. Graduate.
Advanced Independent Study
Prerequisites: grad st & cons instr.
Last Taught: Spring 2025, Fall 2024, Fall 2023, Spring 2023.
Current Offerings: https://catalog.uwm.edu/course-search/