

NANO-TO BODY-SCALE BIOMECHANICS

Biomechanics applies principles of mechanics of solid and fluid materials from nano- to body system-levels. Nano- and cell-scale applications include measuring the forces cells exert on their environment, as well as nano-technology and lab-on-a-chip applications. Tissue- and systems-scale applications include characterizing physiologic systems and disease states and designing medical devices.

COMPANY SNAPSHOT

ABIOMED
 Aesculap
 AMTI
 AngioDynamics
 ARCCA
 Arthrex
 Aspen Medical Products
 ATEC Spine
 AxioMed
 B. Braun Medical
 Becton Dickinson
 Bionix
 Boston Scientific
 Bruker
 Cell Scale
 DePuy Synthes (Johnson & Johnson)

DJO Global
 Edwards Lifesciences
 Endolite
 Endologix
 Ethicon (Johnson & Johnson)
 Globus Medical
 Instron
 Intellijoint
 Intuitive Surgical
 Johnson & Johnson
 LeMaitre Vascular
 MEA Forensics
 Medtronic
 Merit Medical
 NuVasive
 Orthofix

Oscor
 Ossur
 Replication Medical Inc.
 Rimkus
 Robson Forensic
 RTI Surgical Holdings
 Scanco
 Smith & Nephew
 Stryker
 SynCardia Systems, LLC
 TA Instruments
 Terumo
 Thoratec Corporation
 VICON
 Wright Medical Group
 Zimmer Biomet

APPLICATION EXAMPLES

Nano devices, Mechanobiology, Biomolecular, cellular, and tissue engineering, Bio-MEMS (biomedical microelectromechanical systems), Neuroengineering, Biofluid mechanics, Injury biomechanics, Rehabilitation & regenerative medicine, Artificial organs, Musculoskeletal (cartilage, bone, tendon, ligament, muscle, etc.), Cardiac mechanics, Prosthetic & orthotic design, Orthopaedics, Gait analysis, Sport engineering, Medical device design, Wearable technology, Biomechatronics, Robotic exoskeletons, Musculoskeletal models, Dynamic simulations and finite element (FE) models

RELEVANT COURSE EXAMPLES (*REQUIRED IN BME CURRICULUM)

BMEG 309	*Bioengineering Mechanics I Lab	CIEG 401	Introduction to the Finite Element Method
BMEG 310	*Bioengineering Mechanics I	KAAP 430	Exercise Physiology
BMEG 311	*Bioengineering Mechanics II	MEEG 413	Nanomaterials and Nanotechnology
BMEG 340	*Biomedical Modeling and Simulation	MEEG 417	Composite Materials
BMEG 441	Biomechatronics	MEEG 451	Intro to Microsystems
BMEG 442	Engineering Exercise and Sports	MEEG 453	Manufacturing Processes and Systems
BMEG 445	Material-Human Body Interfaces	MEEG 481	Cytomechanics
BMEG 446	Neuromechanics of Human Motion	MEEG 482	Clinical Biomechanics
BMEG 463	Mechanotransduction	MEEG 484	Biomaterials and Tissue Eng App
BMEG 464	Medical Device Development	MEEG 486	Cell and Tissue Transport
BMEG 465	Tissue Biomechanics and Modeling	MSEG 410	Experimental Mechanics of Composites
BMEG 479	Introduction to Medical Imaging Systems	MSEG 415	Degradation and Failure of Materials
BISC 401	Molecular Biology of the Cell	MSEG 421	Linear Systems

PATHWAY EXAMPLES

Pathways are optional groupings of 5 technical electives (including at least 2 BME) that demonstrate depth and focus in a particular area. Examples below are provided for reference and are not all-inclusive. Be sure to check current course offerings, approved technical electives, and pre-requisites (all subject to change).

Path 1: Micro-Scale Mechanics

BMEG 445	Material-Human Body Interfaces
BMEG 463	Mechanotransduction
MEEG 413	Nanomaterials and Nanotechnology
MEEG 484	Biomaterials and Tissue Eng App
BISC 401	Molecular Biology of the Cell

Path 2: Macro-Scale Mechanics & Manufacturing

BMEG 441	Biomechatronics
BMEG 446	Neuromechanics of Human Motion
BMEG 464	Medical Device Development
BMEG 465	Tissue Biomechanics
MEEG 482	Clinical Biomechanics

Extracurricular Enhancement

Biomechanical Engineering Minor
 4+1 Master of Science in Robotics
 RSO: Assistive Medical Technologies (AMT)
 RSO: Orthotics & Prosthetics Club