Master of Science in Biomedical Engineering (BME)

Department of Biomedical, Industrial & Human Factors Engineering
Wright State University

MSBME Focus Areas

Biomedical Ergonomic Engineering: For students interested in industrial ergonomics and human engineering. Provides the student with a background in ergonomics, biomechanics and human modeling with respect to industrial and health care environments. *Advisors: Dr. Caroline Cao, Dr. David Reynolds*

Biomaterials/Biomechanics: For students interested in medical devices, design and manufacturing of orthopaedic implants, biomechanics and modeling. Emphasis is placed on the biomaterials, biomechanics, and biocompatibilities of implants that aim to improve the quality of life of patients with conditions such as trauma, degenerative disease, fractures, and joint arthritis, with the goal to restore functionality and mobility and reduce pain. *Advisors: Dr. Tarun Goswami, Dr. David Reynolds*

Biomedical Signal/Imaging Processing: For students interested in designing medical imaging equipment and in extracting diagnostic information from medical images and signals. Emphasis is placed on radiographic systems, particularly computed tomography, as well as magnetic resonance and ultrasound imaging. Additional applications include near-infrared spectroscopy and magnetic brain-wave imaging.
Advisors: Dr. Ping He, Dr. Nasser Kashou, Dr. Ulas Sunar

Biomedical Systems Engineering: For students who want to follow a more generalized degree path.
Advisors: Dr. David Reynolds

Neuroengineering: For students interested in neuroergonomics and human engineering. Provides courses related to principles, computational methods and technologies in the area of neuroengineering. Emphasis is placed on using engineering techniques to understand, design, and analyze the neural-system interface.
Advisor: Dr. Caroline Cao, Dr. Sherif Elbasiouny, Dr. Nasser Kashou, Dr. Ulas Sunar

MSBME Degree Requirements

● 30 semester credit hours (thesis optional) ● 18 credit hours of BME courses (6000- or 7000-level) ● 15 credit hours of 7000+-level BIE Department courses ● 6 credit hours of approved courses with math/statistics content ● BME/IHE 6010 Ethics in Engineering Research & Practice (1 cr) ● maximum of 4 credit hours of independent study/non-thesis research ● maximum of 8 credit hours of thesis research ● an approved Program of Study before 9 credit hours are earned. Students can combine focus areas to customize a program of study to suit individual interests. Additionally, full-time or part-time study, evening and distance education classes are available. Funding is awarded on a competitive basis for qualified students.

Prerequisite coursework: Students should expect to be prepared for their program with knowledge of topics such as calculus, differential equations, linear algebra, statistics, calculus-based physics, chemistry, computations/programming, statics, circuits, linear systems, anatomy, physiology, and/or other core engineering courses, depending on the student's chosen degree and focus area.

Biomedical, Industrial & Human Factors Engineering Graduate Course Offerings at a Glance: 2015-16

Fall Courses

Course	Cr	Title	Ergonomic Engineering	Biomaterials/ Biomechanics	Signals/ Imaging Processing	Biomedical Systems	Neuro-engineering	Approved math/stats	Distance option
BME 6010	1	Ethics in Engineering Research & Practice	•	•	•	•	•		D
BME 6310	3	Ergonomics	•	•		•	•		D
BME 6410	3	Biothermodynamics	•	•		•			
BME 6550	4	Bioinstrumentation	•			•			
BME 6701	4	Medical Imaging			C	•	•		
BME 6850	3	Six Sigma for Engineers	•	•		•			D
BME 7110	3	Biomedical Signals			C	•		M	
BME 7133	3	Nuclear Magnetic Resonance in Medicine (odd)			•	•			
BME 7210	3	Orthopaedic & Prosthetic Engineering	•	•		•	•		
BME 7315	3	Ergonomic Engineering (odd)	•	•		•			
BME 7330	3	Neuromuscular Engineering (even)	•	•		•	•		
BME 7980	3	Failure Analysis of Medical Devices		•		•	•		
IHE 6010	1	Ethics in Engineering Research & Practice	•	•	•	•	•		D
IHE 6120	3	Probability for Engineers	•	•	•	•	•	M	D
IHE 6300	3	Fundamentals of Human Factors Engineering	•	•		•	•		D
IHE 6310	3	Ergonomics							D
IHE 6400	3	Engineering Economy							D
IHE 6711	4	Optimization Methods							D
IHE 6820	3	Supply Chain Analysis & Design							D
IHE 6850	3	Six Sigma for Engineers							D
IHE 6980	3	Computational Neuroergonomics and Healthcare Applications	•			•	•		D
IHE 7300	3	Research Methods in HFE (not offered F15)	•	•			•	M	D
IHE 7315	3	Ergonomic Engineering (odd)	•	•		•	•		
IHE 7340	3	HFE in Mobile Computing	•						
IHE 7510	3	Data Mining						M	D
IHE 7810	3	Engineering Health Systems				•			
IHE 7980	3	Manual Control (IHE 7430 as of F16; cross-listed with PSY 9020)	•	•			•		
EGR 7050	3	Design & Analysis of Engineering Experiments	•	•	•	•	•	M	D

Spring Courses

Course	Cr	Title	Ergonomic Engineering	Biomaterials/ Biomechanics	Signals/ Imaging Processing	Biomedical Systems	Neuro-engineering	Approved math/stats	Distance option
BME 6010	1	Ethics in Engineering Research & Practice	•	•	•	•	•		D
BME 6421	3	Biotransport	•	•		•	•		
BME 6422	4	Advanced Biotransport & Artificial Internal Organs		•		•	•		
BME 6440	4	Biomaterials		•		•			
BME 6702	3	Advanced Medical Imaging			C	•			
BME 7111	3	Advanced Biomedical Signals (odd)		•		•	•		
BME 7112	3	Processing of Medical Images			C	•	•		
BME 7113	3	Medical Image Analysis (cross-listed with CEG 7590)			•	•	•		D
BME 7131	3	Medical Ultrasonics (even)			•	•	•		
BME 7132	3	Computed Tomography			•	•			
BME 7135	3	Photon Emission Imaging (odd)			•	•			
BME 7220	3	Experimental Orthopaedic Engineering		•		•	•		
BME 7310	3	Advanced Ergonomics	•	•		•	•		D
BME 7331	3	Quantitative Workload Analysis (not offered Spring 2016)	•	•		•			
BME 7350	3	Human Control Engineering	•	•		•	•		
BME 7370	3	Medical Devices	•	•		•	•		
BME 7850	3	Lean Process Improvement for Engineers	•			•			D
BME 7980	3	Biomedical Optics			•	•			
BME 7980	3	From Neurons to Behavior in Health and Disease				•	•		
IHE 6010	1	Ethics in Engineering Research & Practice	•	•	•	•	•		D
IHE 6130	3	Statistics for Engineers	•	•	•	•	•	M	D
IHE 6320	3	Human-System Interaction & Usability Engineering	•			•			D
IHE 6410	3	Technology-Based Ventures							D
IHE 6420	1	Innovation & Entrepreneurship Seminar Series							D
IHE 6510	4	Computer Applications in IHE	•			•	•		
IHE 6712	4	Simulation & Stochastic Models							D
IHE 6810	3	Production & Service Systems Analysis							D
IHE 7010	3	Understanding & Aiding Human Decision Making							D
IHE 7300	3	Research Methods in HFE (offered S16; usually taught in fall)	•	•		•	•	M	D
IHE 7310	3	Advanced Ergonomics	•	•		•	•		D
IHE 7331	3	Quantitative Workload Analysis	•	•		•			
IHE 7360	3	Cognitive Systems Engineering					•		D
IHE 7370	3	Medical Devices	•	•	•	•	•		
IHE 7711	3	Integer Optimization and Heuristics						M	D
IHE 7712	3	Discrete Event Modeling and Analysis							D
IHE 7713	3	Stochastic Models for Engineers (even; but not offered S16)							D
IHE 7820	3	Engineering Supply Chain Systems (odd; but offered S16)							D
IHE 7850	3	Lean Process Improvement for Engineers	•			•			D
IHE 7980	3	Human Issues in Information Security							
EGR 7020	3	Systems Engineering & Analysis	•	•	•	•	•		D

Summer Courses

Course	Cr	Title	Ergonomic Engineering	Biomaterials/ Biomechanics	Signals/ Imaging Processing	Biomedical Systems	Neuro-engineering	Approved math/stats	Distance option
BME/IHE 6850	3	Six Sigma for Engineers	•	•		•			D
IHE 7980	3	Simulation Analysis Using Multi-Modal Models							

Other Department Courses

Course	Cr	Title	Ergonomic Engineering	Biomaterials/ Biomechanics	Signals/ Imaging Processing	Biomedical Systems	Neuro-engineering	Approved math/stats	Distance option
CS 5260	3	Numerical Methods for Computational Science (fall/spring)			•			M	
STT 6300	3	Biostatistics (fall)			•			M	
EE 7150	3	Digital Image Processing (fall)			•		•		
P&N 6420	3	Introductory Neuroscience (fall/spring)	•	•		•	•		

KEY: √ = suggested focus area course;   C = required core focus area course;   M = approved math/stats course;   D = available via distance education