

Masters of Engineering Curriculum 2016-2017

College of Engineering Requirements: 30 credits or more (no more than 2 credits graded S/U), a GPA of 2.5, and no grade lower than a C-.

Meining School of Biomedical Engineering Degree Requirements:

- 3** Engineering design: BME 5500 – Innovation and Design of Biomedical Technologies. Fall.
- 6** MEng Research Project (6 credits minimum): BME 5910 (2 credits – 1st semester) and BME 5920 (4 credits – 2nd semester)
MEng Industrial Project (6 credits minimum): BME 5911 (2 credits – 1st semester) and BME 5921 (4 credits – 2nd semester)
- 12** BME Core (no more than 6 credits outside the College of Engineering)
- 2** BME Seminar: BME 5010 (S/U). Fall AND Spring
- 7** Optional Electives (3 credits need to be leadership development section)

BME Core

Cellular Engineering, Tissue Engineering, and Drug Delivery Area:

Fall Courses:

AEP 4700 – Biophysical Methods (not offered)
BEE 4640 – Biosensors and Bioanalytical Techniques
BIOMG 3850 – Developmental Biology
BIOMG 4000 – Genomics
BIOMG 4370 – Cell Proliferation and Senescence
BIOMG 6310- Protein Structure and Function
BME 4810 – Biomedical Reaction Engineering (not offered)
BME 5850 – Practice in Tissue Engineering
BME 6120 - Precision and Genomic medicine
BME 6130- Engineering the Microbiome
BME 6310 –Principles of Drug Delivery
CHEME 5430 – Bioprocess Engineering
MAE 6630 – Immuno-Engineering (not offered)

Spring Courses:

AEP 5520 – Physics of Life (not offered)
BEE 7600 – Nucleic Acid Engineering (not offered)
BIOAP 4140 – Principles of Pharmacology
BIOAP 4580 – Mammalian Physiology
BIOMG 4320 – Cell Biology
BME 5830 – Cell-Biomaterials Interactions
BME 6110 – Stem Cell Bioengineering (not offered)
BME 6501 - Natural Engineering: Developmental Biology Paradigms for Regenerative Medicine (not offered)
BME 6650 – Principles of Tissue Engineering
BME 6680 – Cancer for Engineering and Physicists
CHEME 5440 - Systems Biology in Biotechnology and Medicine (not offered)
CHEME 7740 – Principles of Molecular Stimulation
CHEME 7770 – Advanced Principles of Bimolecular Engineering

Biomedical Mechanics and Biomaterials Area:

Fall Courses:

BME 5390/FSAD 4390 – Biomedical Materials and Devices for Human Body Repair
BME 5810 – Soft Tissue Biomechanics
BME 6690 - Biofluid Mechanics and Physiological Transport (next offered SP17)
MAE 6240 – Physics of Micro and Nanoscale Fluid Mechanics
MAE 6670 – Soft Tissue Biomechanics 2 (don't need BME 5810 to take this course)
MSE 6010 – Chemistry of Materials (not offered)

Spring Courses:

BME 6501 - Natural Engineering: Developmental Biology Paradigms for Regenerative Medicine (not offered)
BME 6640 – Mechanics of Bone (not offered)
BME 4640 - Orthopaedic Tissue Mechanics
CEE 6725 – 3D Printing Parts that Don't Break: From Processing to Performance
CHEME 6400 – Polymeric Materials
MAE 5650 – Biofluid Mechanics
MSE 4610 – Biomedical Materials and their application
MSE 5130 – Mechanobiology of Materials and Cells (not offered)
MSE 5230 – Physics of Soft Materials
MSE 5410 – Nanofabrication for Integrated Circuits
MSE 5720 – Computational Materials Science
MSE 5850 – Electronic, Magnetic, and Dielectric Properties of Materials
MSE 5620 – Biomineralization: The Formation and Properties of Inorganic Biomaterials
MSE 6010 – Chemistry of Materials

Bioinstrumentation and Diagnostics Area:

Fall Courses:

AEP 6620 – Micro/Nano-Fabrication and Processing
BEE 4590 – Biosensors and Bioanalytical Techniques
BEE 4600 – Deterministic and Stochastic Modeling in Biological Engineering
BEE 6550 – Biologically Inspired Microsystems Engineering
BME 4110 – Science and Technology in Human Health (not offered)
BME 4390 – Electronics for Biomedical Engineers
BME 4980 – Introduction to Systems and Synthetic Biology (not offered)
BME 5700 – Biophysical Methods
BME 5710 – Analytical Techniques for Material Science
BME 6180 – Principles of Medical Imaging
BME 6320 – Modern Biomedical Microscopy
BME 6670 – Nanobiotechnology
BME 7310 – Advanced Biomedical Engineering Analysis of Biomedical Systems
CS 5786 – Machine Learning Data Science
ECE 4300 – Lasers and Optoelectronics
ECE 5040/BME 5040 – Neural and Bioelectronic Interfaces (not offered)
ECE 5470 – Computer Vision
MAE 6240 – Physics of Micro and Nanoscale Fluid Mechanics

Spring Courses:

AEP 4400 – Quantum and nonlinear optics
BEE 4500 – Bioinstrumentation
BEE 4530 – Computer-Aided Engineering: Applications to Biomedical Processes
BME 4910 – Principles of Neurophysiology
BME 5030 – Electronic Bioinstrumentation (not offered)
BME 5780 – Computer Analysis of Biomedical Images
BME 6260 – Biomedical Optics, Imaging, and Spectroscopy
ECE 4250 – Digital Signal and Image Processing
ECE 4320 - Integrated Micro Sensors and Actuators: Bridging the Physical and Digital Worlds
ECE 4360 – Nanofabrication for Integrated Circuits
ECE 4370 – Fiber and Integrated Optics
MAE 6620 – Biomedical Tech. for Point-of-Care Diag. and Mobile and Global Health

Electives:

Leadership Development:

1) Any courses in the Johnson Graduate School of Management in the NBA or NCC categories at 5000 level or above.

For example:

- NBA 5070 – Entrepreneurship for Scientists and Engineers. Fall or Spring.
- NBA 5110 – Financial Accounting. Fall or Spring.
- NBA 5150 – Leadership Theory and Practice. Fall or Spring.
- NBA 5690 – Management Consulting Essentials. Fall.

2) Additional Relevant Courses:

- BEE 5400 – Engineering Ethics and Professional Practice. Next offered FA16
- BME 5100 – Clinical Preceptorship for Biomedical Engineers. Fall or Spring.
- CEE 5900 – Project Management
- MAE 4610 – Entrepreneurship for Engineers. Fall. (preapproved in regardless of 4000 level)
- MAE 5930 – Systems Engineering and Six Sigma for the Design and Operation of Reliable Systems. Spring

Science and Engineering:

- 1) Any course at the 5000 level or above offered by the College of Engineering.
- 2) Any course at the 4000 level or above offered by the Department of Physics (College of Arts and Science), the Department of Chemistry and Chemical Biology (College of Arts and Sciences), or the various departments in the College of Agriculture and Life Sciences or the College of Arts and Sciences that participate in the Biological Sciences.

Unpaid off-campus internship with industry (student must gain knowledge and experience) in the field of BME:

BME 5940 – Master of Engineering Internship. Fall or Spring.

Larger Scope MEng Project (requires project advisor and MEng director approvals) – BME 5930-Independent Design Project. Fall or Spring.

Project expectation will exceed the 6 credit minimum