MICHIGAN STATE
UNIVERSITY
Department of
Biomedical Engineering

Guidance for Course Plans for Biomedical Engineering Graduate Students
Michigan State University
Department of Biomedical Engineering

Core courses (required for each student) consist of the following:

1. BME803: “Research Methods” (3 credits, Fall Semester)

2. BME840-841: “BioDesignIQ I-II” (3 credits each, Fall-Spring Semester)

3. BME892: Seminar (1 credit, Fall Semester)

4. BME999: At least 24 credits of dissertation research

In addition, 12 credits of electives are required, where students must include each of the following (up to 6 credits may be 400-level courses):

(1) Math or statistics-based course

(1) Life sciences-based course

(1) Engineering-based course (courses available in the College of Engineering, including BME courses)

BME courses may be used to fulfill either the life sciences OR the engineering requirement, since they should include material addressing each discipline.

To guide students and faculty mentors on elective selections, suggested courses are provided for individual research concentration/interest areas on the following pages.

Course Offerings by Concentration Area

Students are advised to custom-design a course plan in consultation with their advisor. Thesis committee members may also provide input on the course plan. Suggested courses are listed grouped by research concentration/interest areas for convenience, but students may choose any course(s) from the list. Courses fulfilling life sciences, engineering, and math requirements are indicated. Conditions for enrollment (prerequisites, overrides) may apply.

Fall Semester:

	Life Sciences	Engineering	Math
Concentration: Synthetic/Systems Biology			
BMB 801: Molecular Biology	√		
PSL 829: Cellular & Integrative Physiology	√		
PHM 819: Principles of Drug-Tissue Interaction	√		
BME 891: Stem Cell Engineering	√	√	
STT 855: Statistical Genetics			√
BE 891: Metabolomics for Food, Health, and Biomedical Engineering (2 cr)	√	√	
STT 808: Biostatistics I			√
PHM 830: Experimental Design & Data Analysis			√
Concentration: Computational Biology			
BMB 801: Molecular Biology	√		
PSL 829: Cellular & Integrative Physiology	√		
PHM 819: Principles of Drug-Tissue Interaction	√		
CMSE 801: Intro Computational Modeling		√	√
CMSE 802: Methods in Computational Modeling		√	√
CSME 890 (301-306, 1 credit each): Bioinformatics series (Genomics)		√	√
STT 855: Statistical Genetics			√
STT 808: Biostatistics I			√
PHM 830: Experimental Design & Data Analysis			√
Concentration: Neural Engineering			
ECE 445: Biomedical Instrumentation	√	√	
NEU 801: Molecular, Cellular, and Developmental Neuroscience I	√		
NEU 802: Systems and Behavioral Neuroscience I	√		
NEU 815: Neuroinformatics and Quantitative Reasoning	√		√
STT 808: Biostatistics I			√
PHM 830: Experimental Design & Data Analysis			√
Concentration: Biomaterials			

MSE 425: Biomaterials and Biocompatibility	√	√	
BMB 801: Molecular Biology	√		
PSL 829: Cellular & Integrative Physiology	√		
PHM 819: Principles of Drug-Tissue Interaction	√		
STT 808: Biostatistics I			√
PHM 830: Experimental Design & Data Analysis			√
Concentration: Biomechanics			
Solid Biomechanics			
ME 820: Continuum Mechanics		√	
Kinematics and Kinetics			
ME 491: Biomechanical Analysis of Human Movement	√	√	
Fluid Biomechanics			
ME 494: Biofluid Mechanics & Heat Transfer	√	√	
ME 830 – Fluid Mechanics		√	
ME 881: Cardiovascular Mechanics	√	√	
General Interest			
STT 808: Biostatistics I			√
PHM 830: Experimental Design & Data Analysis			√
Concentration: Medical Product Development			
ECE 445: Biomedical Instrumentation	√	√	
EGR 440: Engineering Entrepreneurship		√	
ECE 477: Microelectronic Fabrication		√	
ECE 870: Intro to MEMS		√	
STT 808: Biostatistics I			√
PHM 830: Experimental Design & Data Analysis			√
Concentration: Biomedical Optics			
NSC 837: Confocal Microscopy	√		
ECE 476: Electro-Optics (4cr)		√	
ECE 445: Biomedical Instrumentation	√	√	
ECE 477: Microelectronic Fabrication		√	
ECE 870: Intro to MEMS		√	
STT 808: Biostatistics I			√
PHM 830: Experimental Design & Data Analysis			√

Spring Semester:

	Life Sciences	Engineering	Math
Concentration: Synthetic/Systems Biology			
BMB 825: Cell Structure and Function	√		

PHM 819: Principles of Drug-Tissue Interaction	√		
STT 814: Advanced Statistics for Biologists			√
Concentration: Computational Biology			
BMB 825: Cell Structure and Function	√		
PHM 819: Principles of Drug-Tissue Interaction	√		
CMSE 410: Bioinformatics and Computational Biology		√	√
CMSE 801: Intro Computational Modeling		√	√
CSME 890 (301-306, 1 credit each): Bioinformatics series (Genomics)		√	√
BME 891: Dynamical Systems in Computational Biology & Neural Engineering	√	√	
STT814: Advanced Statistics for Biologists			√
Concentration: Neural Engineering			
ECE448: Modeling and Analysis of Bioelectrical Systems	√	√	
BME 891: Dynamical Systems in Computational Biology & Neural Engineering	√	√	
NEU 803: Molecular, Cellular, and Developmental Neuroscience II	√		
NEU 805: Systems and Behavioral Neuroscience II	√		
STT 814: Advanced Statistics for Biologists			√
Concentration: Biomaterials			
BMB 825: Cell Structure and Function	√		
PHM 819: Principles of Drug-Tissue Interaction	√		
CHE 473: Polymers and Materials		√	
MSE 991 (sec002): Advanced Biomaterials	√	√	
STT 814: Advanced Statistics for Biologists			√
Concentration: Biomechanics			
Solid Biomechanics			
ME 495: Tissue Mechanics	√	√	
ME 821: Linear Elasticity		√	
ME 872: Finite Element Method		√	
Kinematics and Kinetics			
ME 861: Advanced Dynamics		√	
Fluid Biomechanics			
ME891/BME891: Critical Review of Emerging Topics in Biomechanics	√	√	
General Interest			
BMB 825: Cell Structure and Function	√		
ME 495: Tissue Mechanics	√	√	

ME 497: Biomechanical Design in Product Development		√	
STT 814: Advanced Statistics for Biologists			√
Concentration: Medical Product Development			
BME 444: Biosensors Med Diagnostics	√	√	
ME 497: Biomechanical Design in Product Development		√	
BME 844: Biosensor Principles and Applications	√	√	
ECE 871: MEMs Fabrication		√	
STT 814: Advanced Statistics for Biologists			√
Concentration: Biomedical Optics			
NSC 837: Confocal Microscopy	√		
ECE 447: Intro to Biomedical Imaging		√	
STT 814: Advanced Statistics for Biologists			√