

## The Biomedical Engineering Curriculum – Version F16

### BiomedE Undergraduate Core Curriculum

<b>Subjects required by all programs</b>	<b>Cr . Hrs.</b>
Math 115, 116, 215, 216	16
Engineering 100, Intro to Engineering	4
Engineering 101, Intro to Computing	4
Chemistry 130	3
Physics 140/1, 240/1	10
Intellectual Breadth	16
	<b>53</b>
<b>Advanced Science and Engineering Math</b>	
Biology 172 or 174, Intro to Biology (F, W)	4
(If using AP Biology credit (195), then Biology 173 (2) is required.)	
BiomedE 241, BiomedE Undergraduate Laboratory (F,W)	4
Chemistry 210/1, Structure and Reactivity I (F, W, Sp)	5
MCDB 310 (F, W, Sp), or BiolChem 415 (F, W), or Chem 351 (F, W), Intro to Biological Chemistry	3-4
	<b>16-17</b>
<b>Required Program Subjects</b>	
BiomedE 211, Circuits and Systems for BiomedE (F,W)	4
(If you are planning on the bioelectrical concentration, it is recommended that you take EECS 215 in place of BiomedE 211.)	
BiomedE 221, Biophysical Chemistry and Thermodynamics (F,W)	4
BiomedE 231, Intro to Biomechanics (W)	
BiomedE 350, Intro to BiomedE Design (W)	3
BiomedE 418, Quantitative Cell Biology (F,W)	3
BiomedE 419, Quantitative Physiology (F)	4
BiomedE 450, BiomedE Design (4) (W) <b>OR</b>	
BiomedE 451, BiomedE Design, part 1 (F) (2) <b>AND</b>	
BiomedE 452, BiomedE Design, part 2 (W) (3)	4-5
BiomedE 458, Biomedical Instrumentation and Design (F,W)	4
MatScie 250, Principles of Engineering Materials (F,W)	4
	<b>34-35</b>
<b>BME Concentration Requirements and Electives*</b>	<b>14</b>
<b>Unrestricted Electives</b>	<b>11</b>
<b>TOTAL</b>	<b>128</b>

\*Must include at least 12 credit hours of engineering courses.

### **BiomedE Biochemical Concentration**

#### **Concentration Requirements (7 credit hours):**

BiomedE 321, Bioreaction Engineering and Design (W)	3
BiomedE 331, Intro to Biofluid Mechanics (F)	4

#### **Lab Requirement (1 class):**

Biology 226, Animal Physiology Lab (F,W)*	2
MatScie 360, Materials Lab I (F)	3
MCDB 429, Laboratory in Cell and Molecular Biology (W)*	3
Physiol 404, Human Physiology Lab (F,W)*	2

#### **Choose one (1 class):**

BiomedE 410, Biomedical Materials (F)	3
BiomedE 479, Biotransport (W)	4

#### **Concentration Electives, if needed:**

BiomedE 332, Intro to Biosolid Mechanics (W)	4
BiomedE 410, Biomedical Materials (F)	3
BiomedE 474, Tissue Engineering (F)	3
BiomedE 476, Advanced Biofluid Mechanics (W)	4
BiomedE 479, Biotransport (W)	4
ChE 519, Pharmaceutical Engineering (W)	3
MatScie 350, Structures of Materials (F)	4
MatScie 412, Polymeric Materials (F)	3
MatScie 420, Mechanical Behavior of Materials (F)	3
MatScie 440, Ceramic Materials (W)	3
MatScie 512, Polymer Physics (W)	3

\*MCDB 429, Biology 226, and Physiology 404 are not considered engineering courses for ABET requirement: students must have a minimum of 48 hours of engineering course work in their bachelor's program.

### **BiomedE Bioelectrical Concentration**

#### **Concentration Requirements (8 credit hours):**

BiomedE 311, Biosystems and Signals (W) or EECS 216, Intro to Signals and Systems (F,W)	4
BiomedE 417, Electrical Biophysics (F)	4

#### **At least one of the following (3-4 credit hours):**

BiomedE 552, Biomedical Optics (F)	3
EECS 320, Intro to Semiconductor Devices (F,W)	4
EECS 351, Digital Signal Processing (F,W)	4
EECS 414, Intro to MEMS (F)	4

#### **Concentration Electives, if needed:**

BiomedE 331, Intro to Biofluid Mechanics (F)	4
BiomedE 552, Biomedical Optics (F)	3
EECS 280, Programming and Introduction to Data Structures (F,W)	4
EECS 301, Probabilistic Methods in Engineering (F,W)	4
EECS 311, Analog Circuits (W)	4
EECS 312, Digital Integrated Circuits (F,W)	4
EECS 320, Intro to Semiconductor Devices (F,W)	4
EECS 334, Principles of Optics (W)	4
EECS 414, Intro to MEMS (F)	4
EECS 423, Solid State Device Lab (F)	4
EECS 434, Principles of Photonics (F)	4
EECS 435, Fourier Optics (W numbered years)	3
EECS 438, Advanced Lasers and Optics Lab (W)	4
EECS 452, DSP Lab (F,W)	4
EECS 460, Control Systems, Analysis and Design (F)	3
Math 354, Fourier Analysis and its Applications* (“sporadically”)	3
Math/BiomedE 464, Inverse Problems (W)	3
MechEng/BiomedE 424, Engineering Acoustics (F)	3
NERS/BiomedE 481, Engineering Principles of Radiation Imaging (W)	2

\*Math 354 is not considered an engineering course for the ABET requirement: all students have a minimum of 48 credit hours of engineering in their bachelor’s program.

### **BiomedE Biomechanical Concentration**

#### **Concentration Requirements (8 credit hours):**

BiomedE 331, Intro to Biofluid Mechanics (F)	4
BiomedE 332, Intro to Biosolid Mechanics (W)	4

#### **At least one of the following (3-4 credit hours):**

BiomedE 456, Biomechanics (F)	3
BiomedE 476, Advanced Biofluid Mechanics (W)	4
BiomedE 479, Biotransport (W)	4
IOE 333, Ergonomics (F,W)	3
IOE 463, Measurement and Design of Work (F)	3
IOE 491, Applied Physical Ergonomics (F)	3
IOE/BiomedE 534, Occupational Biomechanics (W)	3

#### **Concentration Electives, if needed:**

ANAT 403, Human Body* (F,W)	5
BiomedE 456, Biomechanics (F)	3
BiomedE 476, Advanced Biofluid Mechanics (W)	4
BiomedE 479, Biotransport (W)	4
IOE 333, Ergonomics (F,W)	3
IOE 436, Human Factors in Computer Systems (W)	3
IOE 438, Occupational Safety Management (W)	2
IOE 463, Measurement and Design of Work (F)	3
IOE 491, Applied Physical Ergonomics (F)	3
IOE/BiomedE 534, Occupational Biomechanics (W)	3
MechEng 250, Design and Manufacturing I (F,W)	4
MechEng 360, Modeling, Analysis and Control of Dynamic Systems (F,W)	4
MechEng 406, Biomechanics for Engineering Students (W)	3
MoveSci 230, Musculoskeletal Anatomy (F,W)	3
MoveSci 231, Musculoskeletal Anatomy Lab (F,W)	1
MoveSci 435, Biomechanics of Human Locomotion (F every other even year)	3

\*ANAT 403 and MoveSci 230, 231, and 435 are not considered an engineering course for the ABET requirement: all students have a minimum of 48 credit hours of engineering in their bachelor's program.