

**State University of New York at Binghamton**  
**Thomas J. Watson School of Engineering and Applied Science**  
**BS in Biomedical Engineering Four-Year-Program**

Application Code: 274  
 (If undecided use: 0229)

**FALL 2021**

**Engineering Design Division**

*(The freshman year is common to all engineering majors)*

**Fall**

MATH 224/225 Diff Calc/Int Calc(M)  
 CHEM 111 Chemical Principles (L)  
 EDD 111 Introduction to Engineering Design  
 EDD 103 Engineering Communications I  
 General Education Elective (A, G, N, P)  
 Body/Wellness

MATH 226/227  
 PHYS 131  
 EDD 112  
 EDD 104  
 BIOL 113  
 Body/Wellness

**Spring**

Int Tech&App/Inf S. (MATH 225)  
 General Physics I Calculus-based (MATH 225)  
 Introduction to Engineering Analysis (J) (EDD 111)  
 Engineering Communications II (EDD 103)  
 Cell & Molecular Biology

**Year 2**

**Fall**

BME 201 Introduction to Biomedical Engineering (MATH 225, PHYS 131, EDD 112) (Co-req: BIOL 113)  
 MATH 324 Ordinary Differential Equations (MATH 227)  
 CHEM 231 Organic Chemistry I (CHEM 111)

BME 203  
 BME 213  
 MATH 323  
 PHYS 132

**Spring**

Biomedical Modeling & Numerical Methods (MATH 324 or 371, BME 201)  
 Biomolecule Engineering (BIOL 113, BME 201, CHEM 111, MATH 324)  
 Calculus III (MATH 227)  
 General Physics II Calculus-based (PHYS 131)

General Education Elective (A,G,N,P)

General Education Elective (A,G,N,P)

**Year 3**

**Fall**

BME 313 Biomaterials (CHEM 231, BME 213, BIOL 113)  
 BME 318 Biomechanics (PHYS 131, MATH 227)  
 BME 324 Biomedical Instrumentations (L) (BME 201, BME 203, BME 213, PHYS 132)  
 BME 330 Thermodynamics (MATH 323, MATH 324, PHYS 131)  
 BME Depth or Science Elective\*

BME 303  
 BME 340  
 BME 351  
 BIOL 311  
 or  
 BIOL 401

**Spring**

Bio-Fluid Mechanics (BME 318, PHYS 131, MATH 226)  
 Bioinformatics and Biostatistics (BIOL 113, BME 203)  
 Biomedical Engineering Lab (BME 213, BME 324, BME 318) (Co-req: BME 303)  
 Cell Biology (BIOL 113, CHEM 111)  
 Molecular Genetics (BIOL 113, CHEM 111, CHEM 231) (Co-req: CHEM 332)  
 General Education Elective (A, G, N, P)

**Year 4**

**Fall**

BME 413 Biomedical Transport Phenomena (BME 330, BME 318, BME 303)  
 BME 432 Ethics in Engineering (H) (Co-req: BME 450)  
 BME 433 Human Physiology (CHEM 231, BIOL 113)  
 BME 450 Biomedical Engineering Design I (BME 318, BME 351) (Co-req: BME 413)  
 BME Depth elective\*

BME 451  
 Science Elective

**Spring**

Biomedical Engineering Design II (J) (BME 450)  
 (must be 4 credit hours) Refer to \*\*  
 BME Depth or Science Elective\*  
 BME Depth Elective\*

\* BME depth Electives are chosen from your concentration.

\*\* Science electives include: PSYC 111, PSYC 220, ANTH 243 and ANTH 240 (summer and winter online courses), any BCHM 300 level and above, any CHEM 300 level and above, any BIOL 300 level and above.

## Biomedical Engineering with MCAT Preparation

FALL 2021

Year 1

### Engineering Design Division

*(The freshman year is common to all engineering majors)*

#### Fall

MATH 224/225 Calculus I (M)  
CHEM 111 Chemical Principles (L)  
EDD 111 Introduction to Engineering Design  
EDD 103 Engineering Communications I  
General Education Elective (A, G, N, P)  
Body/Wellness

MATH 226/227 Calculus II (MATH 225)  
PHYS 131 General Physics I Calculus-based (MATH 225)  
EDD 112 Introduction to Engineering Analysis (J) (EDD 111)  
EDD 104 Engineering Communications II (EDD 103)  
BIOL 113 Cell & Molecular Biology  
Body/Wellness

#### Spring

BME 201 Introduction to Biomedical Engineering (MATH 225, PHYS 131, WTSN 112) (Co-req: BIOL 113)  
MATH 324 Ordinary Differential Equations (MATH 227)  
CHEM 231 Organic Chemistry I (CHEM 111)

#### Year 2

General Education Elective (A,G,N,P)

- ANTH 240 offered online in summer and winter only (**2 credits**)

#### Spring

BME 203 Biomedical Modeling & Numerical Methods (MATH 227, BME 201)  
BME 213 Biomolecule Engineering (BIOL 113, BME 201, CHEM 111, MATH 324)  
MATH 323 Calculus III (MATH 227)  
PHYS 132 General Physics II Calculus-based (PHYS 131)  
Pre-Med Elective\*

#### Fall

BME 318 Biomechanics (PHYS 131, MATH 227)  
BME 324 Biomedical Instrumentations (L) (BME 201, BME 203, BME 213, PHYS 132)  
BME 330 Thermodynamics (MATH 323, MATH 324, PHYS 131)  
CHEM 341 Intermediate Inorganic Chemistry (CHEM 111)  
Pre-Med Elective\*

#### Year 3

BME 303 Bio-Fluid Mechanics (BME 318, PHYS 131, MATH 227)  
BME 340 Bioinformatics and Biostatistics (BIOL 113, BME 203)  
BME 351 Biomedical Engineering Lab (BME 213, BME 324, BME 318) (Co-req: BME 303)  
Pre-Med Elective\*  
Pre-Med Elective\*

#### Spring

**MCAT typically taken after Junior Year** Before MCAT, courses suggested to take: BIOL 117, BIOL 113, CHEM 111, CHEM 341, CHEM 231, CHEM 332 and 335, PHYS 131, PHYS 132, PSYC 111, **BIOL 403**, BME 340 Biostatistics, & ANTH 240, ANTH 243 (summer and winter online courses).

#### Fall

BME 313 Biomaterials (CHEM 231, BME 213, BIOL 113)  
BME 413 Biomedical Transport Phenomena (BME 330, BME 318, BME 303)  
BME 432 Ethics in Engineering (H) (Co-req: BME 450)  
BME 433 Human Physiology (CHEM 231, BIOL 113)  
BME 450 Biomedical Engineering Design I (BME318, BME 351) (Co-req: BME 413)  
BME Depth elective\*\*

#### Year 4

BME 451 Biomedical Engineering Design II (J) (BME 450)  
BIOL 311 Cell Biology (BIOL 113, CHEM 111)  
Or  
BIOL 401 Molecular Genetics (BIOL 113, CHEM 111, CHEM 231) (Co-req: CHEM 332)  
BME Depth Elective\*\*  
General Education Elective (A, G, N, P)  
General Education Elective (A, G, N, P)

#### Spring

\* Pre-Med Electives: BIOL 117, CHEM 332, CHEM 335 (L), PSYC 111, **BIOL 403**, ANTH 240/243, any BCHM 300 level and above, any CHEM 300 level and above, any BIOL 300 level and above.

\*\* Students who are planning on taking the MCAT, must choose two additional BME depth electives from any of the other BME concentrations.

## **BME Major Concentrations:**

Students are required to select an area of emphasis to gain more in-depth knowledge and specialty training in biomedical engineering. Students must take any two courses from the list of courses prescribed in each concentration to declare their concentration. Courses chosen from a concentration fulfill the BME Depth Electives.

### **Biomaterials and Bio-pharmaceutical Technology Concentration** (Choose two courses to declare this concentration)

- BME 483 Tissue Engineering (Fall) (BME 313, BME 201, BIOL 113) (Co-req: BME 433)
- BME 473 Advanced biomaterials and biocompatibility (Spring) (BME 313)
- BME 463 Bioprocess engineering (Spring) (BME 213, CHEM 231)
- BME 442 Nanotechnology and drug delivery (Fall) (BME 313)

### **Biomedical Devices and Instrumentations Concentration** (Choose two courses to declare this concentration)

- BME 424 Bioimaging (Spring) (BME 324)
- EECE 260 Circuits (Spring) (PHYS 132)
- BME 420 Biomedical Devices and Diagnostics (Fall) (BME 324, BME 351)
- BME 443 Quantitative Instrumental Bioanalysis (Spring) (BME 324, BME 351)
- EECE 301 Signals and Systems (Fall) (EECE 260, MATH 324)

### **Computational Biosystems Concentration** (Choose two courses to declare this concentration)

- BME 470 Advanced Bioinformatics (Fall) (BME 340)
- BME 453 Biomedical Data Management and Regulatory Sciences (Spring) (BME 340)
- BME 472 Experimental Design and Statistical Analysis (Fall) (BME 203, MATH 323)
- BME 484 AI in Biomedical Engineering (Fall) (MATH 227, BME 203, BME 340)
- ISE 314 Computer Programming for Engineers (Fall)

**Pre-Med Concentration** (Students who wish to complete the pre-health concentration, but are not planning on taking the MCAT, must complete two courses from the pre-health concentration below, in addition to any two engineering depth electives from the other three BME concentrations.)

- BIOL 114 Organismal & Population Biology
- CHEM 332 Organic Chemistry II (CHEM 231)
- CHEM 335 Organic Chemistry Lab (CHEM 231)
- CHEM 341 Intermediate Inorganic Chemistry (CHEM 111)
- PSYC 111 Psychology
- BIOL 403 Biochemistry (BIOL 113, CHEM 111, CHEM 231, CHEM 332)
- ANTH 240 – this course is recommended prior to taking the MCAT however, it will not count for a pre-health concentration

*Students who plan on taking the MCAT should follow the BME MCAT Preparation Guideshet to complete the suggested courses prior to taking the MCAT Exam.*