

B.S. in Biomedical Engineering

BME Tracks:

Medical Device and Imaging Track

(120 credits)

First Year

1st Semester		Credits
HUM 101	English Composition: Writing, Speaking, Thinking I	3
PHYS 111	Physics I	3
PHYS 111A	Physics I Lab	1
CHEM 125	General Chemistry I	3
CHEM 125A	General Chemistry Lab I	1
MATH 111	Calculus I	4
FED 101	Fundamentals of Engineering Design	2
FRSH SEM	First-Year Seminar	0
Term Credits		17

2nd Semester

BME 101	Introduction to Biomedical Engineering	0
MATH 112	Calculus II	4
CHEM 126	General Chemistry II	3
PHYS 121	Physics II	3
PHYS 121A	Physics II Lab	1
HUM 102	English Composition: Writing, Speaking, Thinking II	3
Term Credits		14

Second Year

1st Semester

History and Humanities GER 200 level (http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/ger-200-level/)		3
BME 111	Introduction to Physiology	3
BME 301	Electrical Fundamentals of Biomedical Engineering	3
BME 303	Biological and Chemical Foundations of Biomedical Engineering	3
MATH 211	Calculus III A ¹	3
MATH 279	Statistics and Probability for Engineers ²	2
Term Credits		17

2nd Semester

History and Humanities GER 300+ level (http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/ger-300-level/)		3
BME 210	Processing Fund for Biol Signa	3
BME 302	Mechanical Fundamentals of Biomedical Engineering	3
BME 304	Material Fundamentals of Biomedical Engineering	3
MATH 222	Differential Equations	4
Term Credits		16

Third Year

1st Semester

History and Humanities GER 300 (http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/ger-300-level/) ^{***}		3
BME 382	Engineering Models of Physiological Systems	3
MATH 337	Linear Algebra	3
Advanced Engineering Elective ^{**}		3

BME 372	Electronics of Medical Devices	3
Term Credits		15
2nd Semester		
Advanced Science Elective *		3
BME 333	Biomedical Signals and Systems	3
BME 383	Measurement Lab for Physiological Systems and Tissue	3
IE 492	Engineering Management	3
Advanced Engineering Elective **		3
Term Credits		15
Fourth Year		
1st Semester		
BME 386	Bioinstrumentation Laboratory	3
BME 495	Capstone Design I	2
Advanced Engineering Elective **		3
Advanced Science Elective *		3
Advanced Science Elective *		3
Term Credits		14
2nd Semester		
BME 471	Principles of Medical Imaging	3
BME 496	Capstone Design 2	3
BME 489	Medical Instrumentation	3
Humanities and Social Science Senior Seminar GER (http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/hss-capstone/)		3
Term Credits		12
Total Credits		120

* Advanced Science Elective: Chosen in consultation with advisor ; Generally any 300-level or higher science course with prefix CS, MATH, PHYS, CHEM, IE, MTSE. Students in tracks that do not require CHEM243 and/or CHEM244 may use these courses as advanced science electives.

** Advanced Engineering Elective: Technical elective courses with sufficient engineering content: Generally any 300-level or higher courses with prefix BME, ME, CHE, EE, OPSE (excluding MECH320); ECE251 and ECE252 are allowed; chosen in consultation with advisor.

***The BME department recommends ENG 340, ENG 352, and PHIL 351

¹ Students can take MATH 213 (<http://catalog.njit.edu/search/?P=MATH%20213>) (Calculus III B) instead of MATH 211 (<http://catalog.njit.edu/search/?P=MATH%20211>).

² Students can take MATH 333 (<https://catalog.njit.edu/search/?P=MATH%20333>) (Probability and Statistics) instead of MATH 279 (<https://catalog.njit.edu/search/?P=MATH%20279>).

The curriculum for B.S. in Biomedical Engineering – Medical Device and Imaging TRACK Co-op OPTION– CYCLE A and B.S. in Biomedical Engineering – Medical Device and Imaging TRACK Co-op OPTION– CYCLE B are currently under review and will be updated shortly. In the meantime please contact with your advisor.

Biomaterials Track

(120 credits)

First Year

1st Semester		Credits
HUM 101	English Composition: Writing, Speaking, Thinking I	3
PHYS 111	Physics I	3
PHYS 111A	Physics I Lab	1
CHEM 125	General Chemistry I	3

CHEM 125A	General Chemistry Lab I	1
MATH 111	Calculus I	4
FED 101	Fundamentals of Engineering Design	2
FRSH SEM	First-Year Seminar	0
Term Credits		17
2nd Semester		
HUM 102	English Composition: Writing, Speaking, Thinking II	3
PHYS 121	Physics II	3
PHYS 121A	Physics II Lab	1
CHEM 126	General Chemistry II	3
MATH 112	Calculus II	4
BME 101	Introduction to Biomedical Engineering	0
Term Credits		14
Second Year		
1st Semester		
History and Humanities GER 200 level (http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/ger-200-level/)		3
BME 301	Electrical Fundamentals of Biomedical Engineering	3
BME 303	Biological and Chemical Foundations of Biomedical Engineering	3
BME 111	Introduction to Physiology	3
MATH 211	Calculus III A ¹	3
MATH 279	Statistics and Probability for Engineers ²	2
Term Credits		17
2nd Semester		
History and Humanities GER 300+ level (http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/ger-300-level/)		3
BME 210	Processing Fund for Biol Signa	3
BME 302	Mechanical Fundamentals of Biomedical Engineering	3
BME 304	Material Fundamentals of Biomedical Engineering	3
MATH 222	Differential Equations	4
Term Credits		16
Third Year		
1st Semester		
History and Humanities GER 300 (http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/ger-300-level/) ^{***}		3
Advanced Science Elective [*]		3
CHE 230	Chemical Engineering Thermodynamics I	3
CHEM 243	Organic Chemistry I	3
MTSE 301	Principles of Material Science and Engineering	3
Term Credits		15
2nd Semester		
BME 382	Engineering Models of Physiological Systems	3
BME 420	Advanced Biomaterials Science	3
IE 492	Engineering Management	3
Advanced Engineering Elective ^{**}		3
Advanced Science Elective		3
Term Credits		15
Fourth Year		
1st Semester		
BME 383	Measurement Lab for Physiological Systems and Tissue	3
BME 385	Cell and Biomaterial Engineering Laborarory	3
BME 430	Fundamentals of Tissue Engineering	3

BME 495	Capstone Design I	2
Advanced Engineering Elective **		3
Term Credits		14
2nd Semester		
BME 422	Biomaterials Characterization	3
BME 427	Biotransport	3
BME 496	Capstone Design 2	3
Humanities and Social Science Senior Seminar GER (http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/hss-capstone/)		3
Term Credits		12
Total Credits		120

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** Advanced Engineering Elective: Technical elective courses with sufficient engineering content: Generally any 300-level or higher courses with prefix BME, ME, CHE, EE, OPSE (excluding MECH320); chosen in consultation with advisor

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The curriculum for B.S. in Biomedical Engineering – BIOMATERIALS CO-OP TRACK – CYCLE A and B.S. in Biomedical Engineering – BIOMATERIALS CO-OP TRACK – CYCLE B are currently under review and will be updated shortly. In the meantime please contact with your advisor.

Biomechanics Track

(120 credits)

First Year

1st Semester		Credits
HUM 101	English Composition: Writing, Speaking, Thinking I	3
PHYS 111	Physics I	3
PHYS 111A	Physics I Lab	1
CHEM 125	General Chemistry I	3
CHEM 125A	General Chemistry Lab I	1
MATH 111	Calculus I	4
FED 101	Fundamentals of Engineering Design	2
FRSH SEM	First-Year Seminar	0
Term Credits		17
2nd Semester		
HUM 102	English Composition: Writing, Speaking, Thinking II	3
PHYS 121	Physics II	3
PHYS 121A	Physics II Lab	1
CHEM 126	General Chemistry II	3
MATH 112	Calculus II	4
BME 101	Introduction to Biomedical Engineering	0
Term Credits		14

Second Year**1st Semester**

History and Humanities GER 200 level (http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/ger-200-level/)		3
BME 111	Introduction to Physiology	3
BME 301	Electrical Fundamentals of Biomedical Engineering	3
BME 303	Biological and Chemical Foundations of Biomedical Engineering	3
MATH 211	Calculus III A ¹	3
MATH 279	Statistics and Probability for Engineers ²	2
Term Credits		17

2nd Semester

History and Humanities GER 300 *** (http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/ger-300-level/)		3
BME 210	Processing Fund for Biol Signa	3
BME 302	Mechanical Fundamentals of Biomedical Engineering	3
BME 304	Material Fundamentals of Biomedical Engineering	3
MATH 222	Differential Equations	4
Term Credits		16

Third Year**1st Semester**

History and Humanities GER 300 *** (http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/ger-300-level/)		3
BME 382	Engineering Models of Physiological Systems	3
BME 321	Adv Mechanics for Biomed Engr	3
MATH 337	Linear Algebra	3
MECH 236	Dynamics	2
Term Credits		14

2nd Semester

BME 351	Introduction to Biofluid Mechanics	3
BME 383	Measurement Lab for Physiological Systems and Tissue	3
BME 384	Biomechanics Laboratory	3
Advanced Science Elective * [*]		3
IE 492	Engineering Management	3
Term Credits		15

Fourth Year**1st Semester**

Advanced Engineering Elective **		3
BME 451	Biomechanics I	3
BME 478	Introduction to CAD for Biomechanics	4
BME 495	Capstone Design I	2
Term Credits		12

2nd Semester

BME 452	Mechanical Behavior and Performance of Biomaterials	3
BME 496	Capstone Design 2	3
Advanced Science Elective * [*]		3
Advanced Engineering Elective ** ^{**}		3
Humanities and Social Science Senior Seminar GER (http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/hss-capstone/)		3
Term Credits		15

Total Credits**120**

^{*} Advanced Science Elective: Chosen in consultation with advisor ; Generally any 300-level or higher science course with prefix CS, MATH, PHYS, CHEM, IE, MTSE. Students in tracks that

do not require CHEM243 and/or CHEM244 may use these courses as advanced science electives.

**Advanced Engineering Elective: Technical elective courses with sufficient engineering content: Generally any 300-level or higher courses with prefix BME, ME, CHE, EE, OPSE (excluding MECH320); chosen in consultation with advisor

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Pre-Health Option

Students planning to apply to Medical and Dental schools will follow one of the above tracks with specific selections and substitutions to fulfill Medical School admissions guidelines.

The following should be taken as Advanced Science Electives:

Code	Title	Credits
CHEM 473	Biochemistry	3
CHEM 244	Organic Chemistry II	3
CHEM 244A	Organic Chemistry II Laboratory	2

The following should be taken as History and Humanities GER courses:

Code	Title	Credits
STS 221	Introduction to Sociology	3
STS 359	Foundations of Cyberpsychology	3

The following should substitute for BME 303:

Code	Title	Credits
R120 102	General Biology II	4
or R120 201	Foundations Of Biology	
R120 101	General Biology	4
or BIOL 205	Foundations of Biology: Ecology and Evolution Lecture	
or BIOL 206	Foundations of Biology: Ecology and Evolution Lab	

General Education Requirements "Refer to the General Education Requirements for specific information for GER courses"