

BIOLOGY, B.S. (NJCU) AND BIOMEDICAL ENGINEERING, B.S. (NJIT), DUAL DEGREE (3 + 2) PROGRAM

This dual-degree program is designed for students interested in Biology and Biomedical Engineering. New Jersey City University and New Jersey Institute of Technology jointly offer a five-year program of study leading to a Bachelor of Science in Biology from NJCU and a Bachelor of Science in Biomedical Engineering from NJIT. Earning these two degrees increases the chances of obtaining a better entry-level position and opens the door to greater career possibilities. This program combines a traditional liberal arts environment with an intensive technical curriculum.

This dual-degree program is an excellent choice for students who understand the value of a liberal arts education, are interested in careers in the physical sciences and engineering, wish to work as engineers while having a strong background in physics, and wish to maximize their career options.

Students enter as full-time, degree-seeking freshmen and continue their studies for three years at NJCU while taking occasional classes at NJIT, during which time the General Education coursework and the majority of Biology degree requirements from NJCU are satisfied. Students enroll full-time at NJIT during the fourth and fifth years of the program, during which time students focus on required engineering courses, some of which satisfy NJCU's Biology degree requirements. A B.S. in Biology is awarded by NJCU at the end of the fourth year and a B.S. in Biomedical Engineering is awarded by NJIT at the end of the fifth year.

This program is designed for students entering NJCU from high school, with placements into college-level composition and math courses. Transfer students are not guaranteed to have completed coursework appropriate to join the combined B.S. in Biology/B.S. in Biomedical Engineering dual-degree program. Students interested in this dual-degree program are strongly encouraged to make their selections of major as early as possible in consultation with a Biology Department faculty advisor. Advisors will assist students in planning programs of study to complete all program requirements within a five-year time span.

The admission requirements for this program are a minimum cumulative CGPA of 2.5 and a minimum 3.0 GPA in science and mathematics courses. A minimum grade of "C" must be attained in each Biology, Chemistry, Physics and Math course. A minimum of five (5) biology major courses must be completed at NJCU. Any student who does not complete the first year of study at NJIT may return to NJCU to complete the BS degree in Biology.

Code	Title	Credits
Required Biology Courses:		24
BIOL 130	Principles Biology I	4
BIOL 131	Principles Biology II	4
BIOL 230	Cell Biology	4
BIOL 236	Anatomy & Physiology I	4
BIOL 237	Anatomy & Physiology II	4
BIOL 304	Genetics	4
Biology Elective Course:		3-4

Select from among Biology courses number higher than BIOL 230 3-4

Required Physics Courses:		8
PHYS 140	Principles of Physics I - Lecture	3
PHYS 1140	Principles of Physics I - Laboratory and recitation	1
PHYS 141	Principles of Physics II - Lecture	3
PHYS 1141	Principles of Physics II - Laboratory and Recitation	1

Required Chemistry Courses:		18
CHEM 105	General Chemistry I Lecture	3
CHEM 1105	General Chemistry I Recitation/Laboratory	2
CHEM 106	General Chemistry II Lecture	3
CHEM 1106	General Chemistry II Recitation/Laboratory	2
CHEM 207	Organic Chemistry I	3
CHEM 2207	Organic Chemistry I Laboratory	1
CHEM 208	Organic Chemistry II	3
CHEM 2208	Organic Chemistry II Laboratory	1

Required Economics Course:		3
ECON 208	Principles of Economics:Micro	3

Required Mathematics and Computer Science Courses:		16
MATH 192	Calculus and Analytic Geometry I	4
MATH 193	Calculus and Analytic Geometry II	4
MATH 292	Calculus & Analytical Geometry III	4
MATH 311	Differential Equations for Engineers	4

Total NJCU Credits: 83-84

First Year

Semester 1		Credits
(NJCU Courses)		
ENGL 101 or ESL 101	English Composition I or English Composition I for English as a Second Language Students	4-6
MATH 192	Calculus and Analytic Geometry I	4
PHYS 140	Principles of Physics I - Lecture	3
PHYS 1140	Principles of Physics I - Laboratory and recitation	1
CHEM 105	General Chemistry I Lecture	3
CHEM 1105	General Chemistry I Recitation/Laboratory	2
Credits		17-19

Semester 2

Semester 2		Credits
(NJCU Courses)		
ENGL 102 or ESL 102	English Composition II or	4-6
MATH 193	Calculus and Analytic Geometry II	4
BIOL 130	Principles Biology I	4
CHEM 106	General Chemistry II Lecture	3
CHEM 1106	General Chemistry II Recitation/Laboratory	2
Credits		17-19

Second Year

Semester 1		Credits
(NJCU Courses)		
MATH 292	Calculus & Analytical Geometry III	4
CHEM 207	Organic Chemistry I	3

CHEM 2207	Organic Chemistry I Laboratory	1
PHYS 141	Principles of Physics II - Lecture	3
PHYS 1141	Principles of Physics II - Laboratory and Recitation	1
BIOL 131	Principles Biology II	4
Credits		16

Semester 2

(NJCU Courses)

BIOL 230	Cell Biology	4
BIOL 236	Anatomy & Physiology I	4
CHEM 208	Organic Chemistry II	3
CHEM 2208	Organic Chemistry II Laboratory	1
MATH 311	Differential Equations for Engineers	4
Credits		16

Third Year**Semester 1**

(NJCU & NJIT Courses)

BIOL 304	Genetics	4
BIOL 237	Anatomy & Physiology II	4
BIOL 3XX/4XX	Biology Elective	4
BME 101	Introduction to Biomedical Engineering	0
BME 304	Material Fundamentals of Biomedical Engineering	3
Credits		15

Semester 2

(NJCU & NJIT Courses)

FED 101	Fundamentals of Engineering Design	2
BME 301	Electrical Fundamentals of Biomedical Engineering	3
BME 302	Mechanical Fundamentals of Biomedical Engineering	3
2XX	Liberal Arts Literacy	3
MTSE 301	Principles of Materials Science & Engineering	3
Credits		14

Fourth Year**Semester 1**

(NJIT Courses)

CHEM 473	Biochemistry I	3
3XX	Liberal Arts Literacy	3
CHEM 320	Chemical Engineering Thermodynamics	3
BME 210	Biomedical Computing	3
MATH 279	Statistics & Probability for Engineers	2
Credits		14

Semester 2

(NJIT Courses)

BME 382	Engineering Models of Physiological Systems	3
3XX	Liberal Arts Literacy	3
BME 420	Advanced Biomaterials Science	3
BME 383	Measurement Lab for Physiological Systems & Tissues	3

BME 385	Cell & Biomaterials Laboratory	3
Credits		15

Fifth Year**Semester 1**

(NJIT Courses)

BME 430	Tissue Engineering	3
BME 495	Capstone Design I	2
BME XXX	Engineering Track Elective	3
BME 422	Biomaterials Characterization	3
BME XXX	BME Elective	3
Credits		14

Semester 2

(NJIT Courses)

BME 496	Capstone Design II	3
BME 417	Biotransport	3
4XX	Capstone HSS	3
IE 492	Management GER	3
Credits		12

Total Credits**150-154**

Student Learning Outcomes

Upon completion of the Biology, B.S. (NJCU) and Biomedical Engineering, B.S. (NJIT), Dual Degree (3 + 2) program, students will be able to:

1. Demonstrate knowledge of the factual and theoretical basis of biology including mechanisms on the molecular, cellular, organismal, and systems levels.
2. Demonstrate understanding of scientific inquiry and explain how scientific knowledge is discovered and validated.
3. Apply quantitative knowledge and reasoning to describe or explain phenomena in the natural world.
4. Demonstrate knowledge of basic principles of chemistry and their application to understanding living systems.
5. Communicate scientific information in written and/or oral formats.