**Bachelor of Science in Biology**

**Overview of Course Requirements**

- The Bachelor of Science (BS) degree in Biology is offered as a joint program between Rutgers University and the New Jersey Institute of Technology (NJIT) through the Federated Department of Biological Sciences. The BS requires **38 credits of course work in biological sciences**, plus cognate course credits in chemistry, physics, and mathematics. The BS degree requires significant preparation in the mathematical sciences and students are encouraged to enter the degree stream immediately upon entering the university. Courses are offered on the Rutgers and NJIT campuses.

- **CORE COURSE REQUIREMENTS:** All students are required to successfully complete the following courses with final grades of C or better: 120:200 Concepts in Biology (4 credits); 120:201 Foundations of Biology: Cell and Molecular Biology (3 credits) and 120:202 Foundations CMB Laboratory (1 credit); 120:205 Foundations of Biology: Ecology and Evolution (3 credits), and 120:206 Foundations EE Laboratory (1 credit). These five courses are essential prerequisites for all upper level courses in the program.

- **CLUSTER AND LAB/FIELD REQUIREMENTS:** Beyond the core courses, all students must successfully complete (grade of C or better) one course from each of four Biological Concepts Clusters (13 credits minimum) and two courses designated as Laboratory/Field Experience courses (6 credits minimum). Courses taken in one category **cannot** be used to fulfill a requirement in another category; e.g., a laboratory course taken to fulfill Cluster B cannot simultaneously be used to fulfill the Lab/Field requirement.

- **ELECTIVES:** Students complete their course of study by successfully completing, with grades of C or better, courses in biological sciences up to the minimally required 38 credits. It is imperative that students meet with their major advisor early and often in order to properly plan and manage their progress toward a BS degree in Biology.

- **WRITING REQUIREMENT:** Among the courses successfully completed for the BS degree in Biology at Rutgers-Newark, **one** must be designated as Writing Intensive (indicated as WI on the accompanying listing of courses). The scheduling and registration systems at Rutgers designate these courses as Q. This course is included within the 38 degree-credits in biology.

- **COGNATE COURSE REQUIREMENTS:** All cognate courses must be completed with grades of C or better. Cognate courses can be completed at either Rutgers or NJIT. Please note that in the case of sequential cognate courses (for example General Physics I and II and their labs) the entire sequence must be completed at one or the other campus—you cannot mix and match!

**Declaration of Major**

- **RUTGERS MATRICULATED STUDENTS:** Upon successful completion of Concepts in Biology 200 and one of the two Foundations course pairs (201/202 or 205/206), Rutgers students can officially declare their intention to pursue a course of study leading to a BA degree in Biology.

- **DECLARATION PROCESS:** To declare their major, Rutgers students must visit the Biological Sciences Office in Boyden Hall 206 and submit an application for admission to the major. At this time the student’s record will be reviewed and, if accepted into the major, an academic major advisor will be assigned. Students should meet with their advisor on a regular basis, at least once a semester, to plan their course of study and eventually complete a graduation audit (see below).

- **NJIT MATRICULATED STUDENTS:** NJIT students may declare their major on or within one year after first registration and to that effect they should visit NJIT’s Biological Sciences Office, which is located in Rm. 337 in the Central King Building on the NJIT campus.

**Graduation Pre-certification**

- Rutgers students preparing to graduate must do a graduation audit with their academic advisor, and complete the graduation pre-certification process. This should be done early in the semester before their last undergraduate semester of study. Specific deadlines are posted in the department office and the Dean of Students Affairs office. Students must officially file for graduation online: [www.newark.rutgers.edu/dsanwk/file_for_grad.html](http://www.newark.rutgers.edu/dsanwk/file_for_grad.html)

- NJIT students preparing to graduate must complete an application for graduation (by October 15 for January graduation, and November 15 for May graduation). At this time the NJIT certification coordinator will sign the application and perform a graduation audit with the student. The application must be turned in to the registrar.

- Failure to complete the pre-certification process in the proper time window may jeopardize a student’s ability to successfully prepare for graduation.
Below is a listing of all courses offered in Biological Sciences on either the Rutgers or NJIT campuses (school 21 or 28, respectively). All listed courses can be applied toward the major. Typically most courses are taught once a year, however there are exceptions in certain high enrollment or in highly specialized, upper division courses. To assist in the planning process, FA indicates Fall course offerings; SP, Spring; and VR variable. Please note: some courses are offered in different semesters of odd or even years. WI indicates the course meets the Writing Intensive requirement. The scheduling and registration systems at Rutgers identify Writing Intensive courses as Q.

IMPORTANT: As course offerings may change from year to year, please check the online schedule or department office to verify current course offerings.

1. CORE COURSES

   28:120:200 Concepts in Biology  FA, SP  4 cr
   21:120:201 Foundations Cell & Molecular Biol  FA, SP  3 cr
   21:120:202 Foundations Cell Mol Biol Lab  FA, SP  1 cr
   28:120:205 Foundations Ecol & Evol Lecture  FA, SP  3 cr
   28:120:206 Foundations Ecol & Evol Lab  FA, SP  1 cr

2. BIOLOGICAL CONCEPTS CLUSTERS

   A) Ecological and Evolutionary Framework

   21:120:211 Plant Kingdom  SP  4 cr
   28:120:222 Evolution  FA  3 cr
   21:120:280 Ecology  FA  3 cr
   21:120:282 Animal Behavior  SP  3 cr

   B) The Functional Organism

   21:120:230 Biology of Seed Plants  SP  4 cr
   21:120:330 Plant Physiology  FA  4 cr
   21:120:335 General Microbiology  FA  4 cr
   21:120:340 Mammalian Physiology  FA, SP  4 cr
   21:120:342 Developmental Biology Lecture  JFA  4 cr
   21:120:343 Developmental Biology Lab  JFA  1 cr

   C) Molecular and Cellular Mechanisms

   21:120:356 Molecular Biology  FA  3 cr
   21:120:360 Biochemistry  SP  3 cr
   21:120:352 Genetics  SP  3 cr
   21:120:355 Cell Biology  FA  3 cr

   D) Computational Biology

   (see note on next page)

   NJIT Math 371 Physiology and Medicine  FA  3 cr
   NJIT Math 372 Population Biology  FA  3 cr
   NJIT Math 373 Intro Mathematical Biology  SP  3 cr
   NJIT Math 430 Computational Neurosci  FA  3 cr

3. LABORATORY/FIELD EXPERIENCE

   200-Level Courses

   21:120:211 Plant Kingdom  SP  4 cr
   21:120:230 Biology of Seed Plants  SP  4 cr
   21:120:285 Comparative Vertebrate Anatomy  SP  4 cr

   300-Level Courses

   21:120:311 Flora of New Jersey (WI)  FA  4 cr
   21:120:325 Animal Parasites (WI)  JFA  3 cr
   21:120:326 Parasitology Laboratory  JFA  1 cr
   21:120:328 Ecology of Birds  FAdd  3 cr
   21:120:330 Plant Physiology  FA  4 cr
   21:120:335 General Microbiology  FA  4 cr
   21:120:340 Mammalian Physiology  FA, SP  4 cr
   21:120:342 Developmental Biology  JFA  3 cr
   21:120:343 Developmental Biology Lab  JFA  1 cr
   21:120:381 Ecological History of N. America (WI)  FA  3 cr
   28:120:385 Evolution of Behavior Laboratory  FA  3 cr

   400-Level Courses

   21:120:404 Intro to Neuroanatomy  SP  4 cr
   21:120:405 Microanatomy of Tissues  SP  4 cr
   21:120:430 Plant Growth & Development (WI)  SP  4 cr
   28:120:451 Cell Physiology and Imaging  SP  4 cr
   21:120:452 Lab in Molecular Biotechniques (WI)  FA/SP  4 cr
   28:120:475 Ecological Field Methods  FA, SP  3 cr

4. ADDITIONAL COURSE OFFERINGS

   28:120:225 Insects and Human Society  SP  3 cr
   21:120:325 Animal Parasites (WI)  FA  3 cr
   21:120:326 Parasitology Laboratory  FA  1 cr
   28:120:338 Ecology of the Dining Hall  FA  3 cr
   21:120:342 Developmental Biology  FA  3 cr
   21:120:343 Developmental Biology Lab  FA  1 cr
   28:120:344 Physiological Mechanisms  SP  3 cr
   28:120:345 Comparative Vert Physiology  SP  3 cr
   21:120:350 Immunology  SP  3 cr
   21:120:365 Evolution of Humans (WI)  FA  3 cr
   28:120:368 Ecology & Evolution of Disease  SP  3 cr
   21:120:370 Plant Ecology  SP  3 cr
   28:120:375 Conservation Biology  FA  3 cr
   28:120:383 Neural Basis of Behavior  FA  3 cr
   28:120:400 Biology of Science Fiction  FA  3 cr
   21:120:402 Biology of Cancer (WI)  FA  3 cr
   21:120:411, 412 Biol Teaching Internship  FA, SP  1 cr
   21:120:422 Biological Invasions  SP  3 cr
   21:120:431 Modern Plant Biology  SP odd  3 cr
   28:120:440 Cell Biology of Disease  FA  3 cr
   21:120:444 Cellular Neurobiology (WI)  SP  3 cr
   21:120:445 Neuroendocrinology (WI)  FA,SP  3 cr
   28:120:447 Cell & Systems Neurobiol  SP  3 cr
   28:120:448 Neurophysiology  FA  3 cr
   21:120:455 Molecular Cell Biology (WI)  FA  3 cr
   21:120:491 Problems in Biology  FA  1-3 cr
   21:120:492 Problems in Biology  SP  1-3 cr
   21:120:493 Seminar in Biology  FA  1 cr
   21:120:494 Seminar in Biology  SP  1 cr

5A. COGNATE COURSES

   21:160:115 General Chemistry  FA, SP  4 cr
   21:160:116 General Chemistry  SP  4 cr
   21:160:113 General Chemistry Lab  FA, SP  1 cr
   21:160:114 General Chemistry Lab  FA, SP  1 cr
   21:160:335 Organic Chemistry I  FA  4 cr
   21:160:336 Organic Chemistry II  SP  4 cr
   21:160:331 Organic Chemistry Lab  FA  2 cr
   21:750:203 or 213 Physics I  FA  4 cr
   21:750:204 or 214 Physics II  SP  4 cr
   21:750:205 Physics Lab I  FA  1 cr
   21:750:206 Physics Lab II  SP  1 cr
   21:640:135 Calculus I  FA, SP  4 cr
   21:640:136 Calculus II  FA, SP  4 cr
   21:640:235 Comp & Prog, I, II or NJIT BNF 153, 156  FA, SP  6 cr
   21:640:231 Numerical Analysis or NJIT Math 340  FA, SP  3 cr
   21:640:314 Elementary Diff Eq's or NJIT Math 352  SP  3 cr
   21:640:222 Differential Eq's or NJIT Math 337  SP  3 cr
   21:640:219 Basic Linear Algebra or NJIT Math 340  FA  3 cr
   21:640:221 Linear Algebra or NJIT Math 326  FA  3 cr
   21:640:226 Discret Analysis or NJIT Math 340  FA  3 cr
   21:640:227 Appl Num Methods or NJIT Math 340  FA, SP  3 cr

5B. ACCEPTABLE COGNATE COURSES AT NJIT

   NJIT Chem 125,126 General Chemistry  FA, SP  6 cr
   NJIT Chem 124 General Chem Lab  FA, SP  1 cr
   NJIT Chem 243,244 Organic Chemistry  FA, SP  6 cr
   NJIT Chem 244A Organic Chem Lab  FA, SP  2 cr
   NJIT Phys 111,121 Physics I, II  FA, SP  8 cr
   NJIT Phys 111A,121A Physics Lab  FA, SP  2 cr
   NJIT Math 111,112,211 Calculus I, II, III  FA, SP  11 cr

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Note that the Cluster D courses have pre-requisites that must be completed before one can register for these courses. Those course-specific pre-requisites are as follows:

D) Computational Biology

**NJIT Math 371**  Physiology and Medicine  
Pre-requisites:  
21:640:314 Elementary Differential Equations or  
**NJIT Math 222** Differential Equations

**NJIT Math 372**  Population Biology  
Pre-requisites:  
21:640:314 Elementary Differential Equations or  
**NJIT Math 222** Differential Equations

**NJIT Math 373**  Introduction to Mathematical Biology  
Pre-requisites:  
21:640:235 Calculus III  
21:640:219 Basic Linear Algebra or  
**NJIT Math 337** Linear Algebra

**NJIT Math 430**  Computational Neuroscience  
Pre-requisites:  
21:640:235 Calculus III  
21:750:204 General Physics II  
21:198:101 Comp & Prog. I or  
**NJIT BNFO 135, 136**