Biology Major Checklist for the Specialization in Bioengineering

Please refer to the Undergraduate Catalog for the official policy, full course options, and requirements in detail. Students who wish to pursue this specialization must be accepted into the Bioengineering Minor (BNG) by the College of Engineering and Applied Sciences.

Foundational Courses in Related Fields

At least one semester of the two-semester sequences of required courses in calculus, organic chemistry lectures, and physics lecture/lab must be passed with a letter grade of C or higher.

General Chemistry Sequence	
General Chemistry 1A or 1B (CHE 129 or CHE 131)	
General Chemistry 1 Lab (CHE 133)	
General Chemistry 2 (CHE 132)	
General Chemistry 2 Lab (CHE 134)	

Organic Chemistry Sequence	
Organic Chemistry 1 (CHE 321)	
Organic Chemistry 2 (CHE 322)	
Organic Chemistry Lab (CHE 327)	

Statistics	
AMS 110, BIO 211 or AMS 310	

Calculus Sequence	
Calculus 1 (MAT 125, MAT 131 or AMS 151)	
Calculus 2 (MAT 126, MAT 132 or AMS 161)	

*The Calculus A, B, C sequence requires 3 semesters of calculus lecture for the Bioengineering Specialization.

Physics Sequence	
Physics 1 (PHY 131 or PHY 121)	
Physics 1 Lab (PHY 133)	
Physics 2 (PHY 132 or PHY 122)	
Physics 2 Lab (PHY 134)	

* The Classical Physics A, B, C sequence requires 3 semesters of physics lecture.

** The Physics for Life Sciences sequence is not accepted in the bioengineering specialization.

Students with an AP Chemistry score of 4 or 5, a calculus-level math placement, and finished OCPP objectives may complete the molecular science sequence instead of general chemistry and organic chemistry sequence.

Molecular Science Sequence	
Molecular Science 1 (CHE 152)	
Molecular Science Lab 1 (CHE 154)	
Molecular Science 2 (CHE 331)	
Molecular Science 3 (CHE 332)	
Molecular Science Lab 2 (CHE 381)	

Core Courses in Biology

Core Courses in Biology Lectures	
BIO 201: Organisms to Ecosystems	
BIO 202: Molecular and Cellular Biology	
BIO 203: Cellular and Organ Physiology	

Core Courses in Biology Laboratories	
BIO 204: Fundamentals of Scientific Inquiry 1	
BIO 205 or BIO 207: Fundamentals of Scientific Inquiry 2A or 2B	

Stony Brook Curriculum Courses

BIO 458: Speak Effectively Before an Audience (SPK) (Optional)	
BIO 459: Write Effectively in Biology (WRTD)	

Transfer students must take at least 15 credits of required core and advanced biology at Stony Brook in courses for majors at the 200 level or higher. Both advanced laboratory experiences must be taken at Stony Brook.

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Advanced Course Requirements for the Specialization in Bioengineering

The list of Advanced BIO Courses and Accepted Electives for the Biology Major can be found on the back of this page. All courses must be passed with a letter grade of C or higher. The Specialization in Bioengineering requires:

1. All students in the specialization in Bioengineering must complete the following:

One Advanced Biology Lecture Course (UD BIO 300+)	
One Advanced Biology Laboratory Course (UD BIO 300+)	
BME 100 Introduction to Biomedical Engineering	
BME 120 Programming Fund. In Biomedical Engineering	

2. Students in this Specialization must then choose and complete one of three Sub-Specializations as described below:

Biomaterials/Biomechanics	
BME 260 Statics and Dynamics in Biological Systems	
BME 303 Biomechanics	
One of the Following: BME 353 or BME 381	
Calculus III: AMS 261 or MAT 203	

Bioelectricity	
BME 271 Introduction to Electric Circuits and Bioelectricity	
BME 301 Bioelectricity	
One of the Following: BME 311 or BME 313 or BME 481	
Linear Algebra: AMS 210 or MAT 211	

Molecular/Cellular	
BME 304 Genetic Engineering	
BME 381 Nanofabrication in Biomedical Applications	
Two of the Following: BME 404, BME 402, BME 371	

Upper-Division Writing Requirement

The advanced writing component of the major in Biology requires registration in the 0-credit BIO 459 and an approved co-applicable course. Approved co-applicable courses to complete BIO 459:

- BIO 312 (Area 1 Lecture/ Lab)
- BIO 320 (Area 1 Lecture)
- BIO 364 (Area 1 Lab)
- BIO 365 (Area 1 Lab)
- EBH 302 (Area 1 Lecture)
- BIO 335 (Area 2 Lab)
- BIO 327 (Area 3 Lab)
- BIO 344 (Area 3 Lecture/ Lab)
- BIO 366 (Area 3 Lecture/ Lab)
- BIO 321 (Area 4 Lecture)
- BIO 336 (Area 4 Lecture)
- BIO 352 (Area 4 Lab)
- BIO 353 (Area 4 Lecture)
- BIO 354 (Area 4 Lecture)
- BIO 356 (Area 4 Lab)
- BIO 367 (Area 4 Lab)
- BIO 385 (Area 4 Lecture)
- BIO 386 (Area 4 Lecture)

Upper-Division Writing Requirement	

Transfer students must take at least 15 credits of required core and advanced biology at Stony Brook in courses for majors at the 200 level or higher. Both advanced laboratory experiences must be taken at Stony Brook.

Advanced BIO Courses and Accepted Electives for the Biology Major

The advanced BIO courses and Accepted Electives are listed below in groupings that correspond to four broad areas of biology. The advanced courses are listed below as: Course Indicator, Course Name, Course Type (lecture or lab), and semester usually offered. Please refer to the Undergraduate Catalog for the most up-to date list including full course options, descriptions, policies, and pre-requisites in detail**.**

Area I: Biochemistry, Molecular and Cellular Biology:

- BIO 310 Cell Biology (Lec)(SPRING)
- BIO 312 Bioinformatics and Computational Biology (Lec/Lab) (FALL)♦
- BIO 314 Cancer Biology (Lec)(SPRING)
- BIO 316 Molecular Immunology (Lec)(SUMMER)
- BIO 320 General Genetics (Lec)(SPRING)♦
- BIO 361 Biochemistry I (Lec)(FALL/SPRING)
- BIO 362 Biochemistry II (Lec)(SPRING)
- BIO 364 Laboratory Techniques in Cancer Biology (Lab)(FALL) ♦
- BIO 365 Biochemistry Laboratory (Lab)(FALL) ♦
- BIO 368 Food Microbiology Laboratory (Lec)
- AMS 333 Mathematical Biology (Lec)(FALL)
- BME 304 Genetic Engineering (Lec)(SPRING)
- BME 404 Essentials of Tissue Engineering (Lec)(SPRING)
- CHE 346 Biomolecular Structure and Reactivity (Lec)(FALL)
- CSM 546 Topics Biotechnology (Lecture/Lab) (SPRING)
- CSM 547 Topics in Genetics (Lec)
- EBH 302 Human Genetics (Lec)(FALL) ♦
- EBH 370 Advanced Human Genetics (Lec/Lab) (SPRING)

Area II: Neurobiology and Physiology

- BIO 317 Principles of Cellular Signaling (Lec)(FALL)
- BIO 328 Mammalian Physiology (Lec)(SPRING)
- BIO 332 Computational Modeling of Physiological Sys. (Lec)(SPRING)
- BIO 333 Neurotechnology (Lec) (SPRING)
- BIO 334 Principles of Neurobiology (Lec)(SPRING)
- BIO 335 Neurobiology Laboratory (Lab)(FALL) ♦
- BIO 337 Neurotransmission and Neuromodulation (Lec)(SPRING)
- BIO 338 Selforganization of the Brain (Lec)(FALL)
- BIO 339 Neurobiology of Disease (Lec)(SPRING)
- BIO 347 Introduction to Neural Computation (Lec)(FALL)
- BCP 401 Principles of Pharmacology (Lec)(FALL)
- BME 301 Bioelectricity (Lec)(SPRING)
- BME 303 Biomechanics (Lec)(FALL)
- EBH 316 The Evolution of the Human Brain (Lec)(SPRING)
- EBH 331 Hormones and Behavior (Lec)(SPRING)
- NEU 517 Principles of Cell Signaling (Lec)(FALL)
- NEU 547 Intro to Neural Computation (Lec)(FALL)

Area III: Organisms

- BIO 315 Microbiology (Lec)(SPRING)
- BIO 325 Animal Development (Lec)(FALL)
- BIO 327 Developmental Genetics Laboratory (Lab)(SPRING) ♦
- BIO 341 Plant Diversity (Lec/Lab) (SPRING)
- BIO 344 Chordate Zoology (Lec/Lab) (SPRING) ♦
- BIO 348 Herpetology (Lec/Lab) (SPRING)
- BIO 366 Molecular Microbiology Laboratory (Lec/Lab) (FALL) ♦
- CSM 548 Current Topics in Microbiology (Lab)(Fall)
- MAR 370 Marine Mammals (Lec)(FALL)
- MAR 375 Marine Mammal/Sea Turtle Rehab. (Lec) (SPRING)
- MAR 376 Biology & Conservation/ Sea Turtles (Lec) (FALL)
- MAR 377 Biology & Conservation/Sea Birds (Lec) (SPRING)
- MAR 380 Ichthyology (Lec/Lab) (FALL)

♦ Indicates that the Upper- Division Writing Requirement can be completed in the course

Area IV: Ecology and Evolution

- BIO 319 Landscape Ecology Laboratory (Lab)(FALL)
- BIO 321 Ecological Genetics (Lec)(SPRING) ♦
- BIO 336 Conservation Biology (Lec)(FALL) ♦
- BIO 351 Ecology (Lec)(FALL)
- BIO 352 Ecology Laboratory (Lab)(FALL) ♦
- BIO 353 Marine Ecology (Lec)(SPRING) ♦
- BIO 354 Evolution (Lec)(FALL) ♦
- BIO 356 Applied Ecology & Conservation Biology Laboratory (Lab)(SPRING)
- BIO 358 Biology & Human Social & Sexual Behavior (Lec)(SPRING)
- BIO 367 Molecular Diversity Laboratory (Lab)(SPRING) ♦
- BIO 383 Paleobiology (Lec/Lab) (SPRING)
- BIO 384 Intermediate Statistics (Lec)(FALL)
- BIO 385 Plant Ecology (Lec)(SPRING) ♦
- BIO 386 Ecosystem Ecology & the Global Environ. (Lec)(SPRING) ♦
- ANT 361 Primate Conservation (Lec)
- EBH 359 Behavioral Ecology (Lec)(FALL)
- EBH 380 Genomics (Lec)(FALL)
- EBH 381 Genomics Laboratory (Lec/Lab) (SPRING)
- ENS 311 Ecosystem Ecology and the Global Environ. (Lec, not for credit in addition to BIO 386) (SPRING)
- ENV 301 Sustainability of the Long Island Pine Barrens (Lec)
- MAR 301 Environmental Microbiology (Lec/Lab) (FALL)
- MAR 302 Marine Microbiology and Microbial Ecology (Lec, not for credit in addition to MAR 301) (SPRING)
- MAR 303 Long Island Marine Habitats (Lec/Lab) (FALL)
- MAR 305 Experimental Marine Biology (Lab)(FALL)
- MAR 315 Marine Conservation (Lec)(SPRING)
- MAR 320 Limnology (Lec/Lab) (SPRING)
- MAR 373 Marine Apex Predators: Ecology and Conservation (Lec)(FALL)
- MAR 384 Diseases of Aquatic Organisms (Lec)(SPRING)
- MAR 386 Ecosystem Science for Fisheries Management (Lec)

Study Abroad Course Options in Area IV

Jamaica:

- MAR 388 Tropical Marine Ecology (Lec/Lab) (WINTER)

Turkana Basin:

- ANT 303 Earth & Life Through Time: Vertebrate Paleontology & Paleoecology (Lec)
- ANT 304 Ecology: Linking People and Nature (Lec)
- ANT 306: Human Evolution (And evidence from the Turkana Basin) (Lec)

Madagascar:

- ANT 309 Comparing Ecosystems in Madagascar (Lec)
- ANT 326 Lemurs of Madagascar (Lec)
- ANT 352 Methods of Studying Primates (Lec)
- ANT 353 Biodiversity Assessment Methods for Tropical Fields Research (Lec)
- ANT 390 Topics in Anthropology (Lec)