Biology Major Checklist for the Specialization in Bioengineering

Please refer to the Undergraduate Bulletin 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 general chemistry lecture and organic chemistry lecture, must be passed with a letter grade of C or higher. All Physics and Calculus courses must be passed with a grade of C or higher.

General Chemistry

At least one semester of the two-semester sequences of required courses in general chemistry lecture and organic chemistry lecture, must be passed with a letter grade of C or higher. All Physics and Calculus courses must be passed with a grade of C or higher.

Advanced Course Requirements for the Specialization in Bioengineering

1. All Students in the Specialization in Bioengineering must complete the following:

   - One Advanced Biology Lecture Course
   - One Advanced Biology Lab Course
   - BME 100 Introduction to Biomedical Engineering
   - Programming Course: ESG 111 or CSE 130 (or equivalent)

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

Sub-Specialization in Biomechanics and Biomaterials

MEC 260 Engineering Statics
BME 303 Biomechanics
AMS 261 Applied Calculus III (or equivalent)
One of the following courses: BME 353 or BME 381

Sub-Specialization in Bioelectricity

ESE 271 Electrical Circuit Analysis I
BME 301 Bioelectricity
AMS 210 Applied Linear Algebra (or equivalent)
One of the following courses: BME 311, BME 313, BME 481

Sub-Specialization in Molecules and Cells

BME 304 Genetic Engineering
BME 381 Nanofabrication in Biomedical Applications
Two of the following three courses: BME 371, BME 402, BME 404

Upper-Division Writing Requirement

The advanced writing component of the major in Biology requires registration in the 0-credit BIO 459 and approval of either a term paper or a laboratory report written for an advanced course in the biological sciences at Stony Brook.

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 of the two 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 Bulletin for full course options, descriptions, policies, and pre-requisites in detail.

**Area I: Biochemistry, Molecular and Cellular Biology:**
- BIO 302 Human Genetics (Lec)(FALL)
- BIO 303 Advanced Human Genetics (Lec/Lab)(SPRING)
- BIO 310 Cell Biology (Lec)(SPRING)
- BIO 311 Techniques in Molecular and Cellular Biology (Lab)(SPRING)
- BIO 312 Bioinformatics and Computational Biology (Lab)(FALL)
- BIO 314 Cancer Biology (Lec)(FALL)
- BIO 315 Microbiology (Lec)(SPRING)
- BIO 316 Molecular Immunology (Lec)
- BIO 320 General Genetics (Lec)(SPRING)
- BIO 361 Biochemistry I (Lec)(FALL)
- 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)
- BIO 511 Topics in Biotechnology (Lab)(SPRING)
- BIO 515 Current Topics in Microbiology (Lab)(FALL)
- BME 304 Genetic Engineering (Lec)(SPRING)
- BME 404 Essentials of Tissue Engineering (Lec)(SPRING)
- CHE 346 Biomolecular Structure and Reactivity (Lec)(SPRING)
- HBM 320 General Microbiology (Lec, not for credit in addition to BIO 315)

**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 Systems (Lec)(SPRING)
- BIO 334 Principles of Neurobiology (Lec)(SPRING)
- BIO 335 Neurobiology Laboratory (Lab)(FALL)
- BIO 337 Neurotransmission and Neurmodulation: Implications for Brain Function (Lec)(SPRING)
- BIO 338 From Synapse to Circuit: Selforganization of the Brain (Lec)(FALL)
- BIO 339 Molecular Development of the Nervous System (Lec)(SPRING)
- ANP 316 The Evolution of the Human Brain (Lec)(SPRING)
- BCP 401 Principles of Pharmacology (Lec)(FALL)
- BME 301 Biomechanics (Lec)(SPRING)
- BME 303 Biomechanics (Lec)(FALL)

**Area III: Organisms**
- BIO 325 Animal Development (Lec)(FALL)
- BIO 327 Developmental Genetics Laboratory (Lab)(SPRING)
- BIO 341 Plant Diversity (Lec/Lab)(SPRING)
- BIO 343 Invertebrate Zoology (Lec/Lab)(FALL)
- BIO 344 Chordate Zoology (Lec/Lab)(SPRING)
- BIO 366 Molecular Microbiology Laboratory (Lab/Lab)(FALL)
- MAR 370 Marine Mammals (Lec)(FALL)
- MAR 371 The Biology and Conservation of Marine Birds and Sea Turtles (Lec)
- MAR 375 Marine Mammal and Sea Turtle Rehabilitation (Lec/Lab)(SPRING)
- MAR 376 Biology & Conservation/ Sea Turtles (Lec) (FALL)
- MAR 377 Biology & Conservation/Sea Birds (Lec) (SPRING)
- MAR 380 Ichthyology (Lec/Lab) (FALL)

**Area IV: Ecology and Evolution**
- BIO 301 Sustainability of the Long Island Pine Barrens (Lec)
- BIO 304 Genomics (Lec/Lab)(FALL)
- BIO 305 Genomics Laboratory (Lec/Lab)(SPRING)
- BIO 319 Landscape Ecology Laboratory (Lab)(FALL)
- BIO 321 Introduction to Ecological Genetics and Genomics (Lec)(FALL)
- BIO 336 Conservation Biology (Lec)(FALL)
- BIO 350 Darwinian Medicine (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 and Conservation Biology Laboratory (Lab)(SPRING)
- BIO 358 Biology and Human Social and Sexual Behavior (Lec)(SPRING)
- BIO 359 Behavioral Ecology (Lec)(FALL)
- BIO 371 Restoration of Aquatic Systems (Lec/Lab)(FALL)
- BIO 385 Plant Ecology (Lec)(SPRING)
- BIO 386 Ecosystem Ecology and the Global Environment (Lec)(SPRING)
- ENS 311 Ecosystem Ecology and the Global Environment (Lec, not for credit in addition to BIO 386)(SPRING)
- 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 (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)

**Study Abroad Course Options in Area IV**

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

**Turkana Basin:**
- ANP 304 Modern and Ancient Environments of Eastern Africa (Lec/Lab)
- ANP 305 Vertebrate Paleontology of the Turkana Basin (Lab)

**Madagascar:**
- ANP 307 Comparing Ecosystems in Madagascar (Lec)
- ANP 326 Lemurs of Madagascar (Lec)
- ANP 325 Primate Behavior (Lec)
- ANP 350 Methods of Studying Primates (Lec)
- ANP 391 Topics in Physical Anthropology (Lec)

**Environmental Biology Electives (May only be used for the Environmental Biology Specialization)**
- ATM 305 Global Atmospheric Change (Lec)
- ATM 397 Air Pollution and its Control (Lec)(SPRING)
- MAR 318 Engineering Geology and Coastal Processes (Lec)
- MAR 333 Coastal Oceanography (Lec)(SPRING)