Biology Major Checklist for the Specialization in Bioengineering

Name: _________________________  SB ID: ________________________  Today’s Date: ______________
Pre Health Interest: _______________  Overall GPA: ____________________  Anticipated Graduation Date: ______

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.

<table>
<thead>
<tr>
<th>General Chemistry</th>
<th>Molecular Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Chemistry 1</td>
<td>Molecular Science 1</td>
</tr>
<tr>
<td>General Chemistry 1 lab</td>
<td>Molecular Science 1 lab</td>
</tr>
<tr>
<td>General Chemistry 2</td>
<td></td>
</tr>
<tr>
<td>General Chemistry 2 lab</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Organic Chemistry</th>
<th>OR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic Chemistry 1</td>
<td>Molecular Science 2</td>
</tr>
<tr>
<td>Organic Chemistry 2</td>
<td>Molecular Science 3</td>
</tr>
<tr>
<td>Organic Chemistry lab</td>
<td>Molecular Science 2 lab</td>
</tr>
</tbody>
</table>

Calculus and Physics*

<table>
<thead>
<tr>
<th>Calculus and Physics*</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>MAT 127 or MAT 132</td>
<td></td>
</tr>
</tbody>
</table>

* The Classical Physics A, B, C sequence requires 3 semesters of physics lecture. The Physics for Life Sciences sequence is not accepted for the Bioengineering specialization.

Core Courses in Biology

<table>
<thead>
<tr>
<th>Lecture courses</th>
<th>Lab Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIO 201: Organisms to Ecosystems</td>
<td>BIO 204</td>
</tr>
<tr>
<td>BIO 202: Molecular and Cellular Biology</td>
<td>BIO 205 or BIO 207</td>
</tr>
<tr>
<td>BIO 203: Cellular and Organ Physiology</td>
<td></td>
</tr>
</tbody>
</table>

Stony Brook Curriculum Courses

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

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, BME 481, 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.
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 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 311 Techniques in Molecular and Cellular Biology (Lab)(SPRING)
- BIO 312 Bioinformatics and Computational Biology (Lab)(FALL)
- BIO 314 Cancer Biology (Lec)(FALL)
- BIO 316 Molecular Immunology (Lec)(SUMMER)
- 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)(FALL)
- EBH 302 Human Genetics (Lec)(FALL)
- EBH 370 Advanced Human Genetics (Lec/Lab)(SPRING)
- BIO 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 Neuromodulation: Implications for Brain Function (Lec)(SPRING)
- BIO 338 Self-organization of the Brain (Lec)(FALL)
- BIO 339 Molecular Development of the Nervous System (Lec)(SPRING)
- 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)
- NEU 517 Principles of Cell Signaling (Lecture)(FALL)

Area III: Organisms
- BIO 315 Microbiology (Lec)(SPRING)
- BIO 325 Animal Development (Lec)(FALL)
- BIO 327 Developmental Genetics Laboratory (Lab)(SPRING)
- BIO 340 Zoology (Lec/Lab)
- BIO 341 Plant Diversity (Lec/Lab) (SPRING)
- BIO 343 Invertebrate Zoology (Lec/Lab)(FALL)
- BIO 344 Chordate Zoology (Lec/Lab)(SPRING)
- BIO 348 Diversity and Evolution of Reptiles and Amphibians (Lec)
- BIO 366 Molecular Microbiology Laboratory (Lec/Lab)(SPRING)
- BIO 380 Entomology (Lec/Lab)
- MAR 370 Marine Mammals (Lec)(FALL)
- MAR 375 Marine Mammal/Sea Turtle Rehab. (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 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 & Conservation Biology Laboratory (Lab)(SPRING)
- BIO 358 Biology & Human Social & Sexual Behavior (Lec)(SPRING)
- BIO 367 Molecular Diversity Laboratory (Lab)(SPRING)
- BIO 371 Restoration of Aquatic Systems (Lec/Lab)(FALL)
- BIO 385 Plant Ecology (Lec)(SPRING)
- BIO 386 Ecosystem Ecology & the Global Environ.(Lec)(SPRING)
- 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)
- 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 366 Plankton Ecology (Lec)
- 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:
- ANP 304 Modern and Ancient Environments of Eastern Africa (Lec/Lab)
- ANP 305 Vertebrate Paleontology of the Turkana Basin (Lab) of the Turkana Basin (Lec/Lab)
- ANP 306 Paleoenthropological Discoveries of the Turkana Basin (Lab)
Madagascar:
- 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)