# BIOLOGY MAJOR

## Requirements

## Biology Major Requirements

For a 67-credit to 71-credit major in biology, students complete the following:

| Code | Title | Credits |
|---|---|---|
| BIOL 1171 & 1171L | General Biology I and General Biology I Lab | 4 |
| BIOL 1172 & 1172L | General Biology II and General Biology II Lab | 4 |
| BIOL 1173 & 1173L | General Biology III and General Biology III Lab | 4 |
| BIOL 4999 | Capstone Seminar (Shell) | 3 |
| CHEM 1171 & 1171L | General Chemistry I and General Chemistry I Lab | 4 |
| CHEM 1172 & 1172L | General Chemistry II and General Chemistry II Lab | 4 |
| CHEM 2271 & 2271L | Organic Chemistry I and Organic Chemistry I Lab | 4 |
| CHEM 2272 & 2272L | Organic Chemistry II and Organic Chemistry II Lab | 4 |
| MATH 1121 | Applied Calculus I | 3-4 |
| or MATH 1171 | Calculus I | |
| MATH 2217 | Statistics I | 3-4 |
| or MATH 1122 | Applied Calculus II | |
| or MATH 1172 | Calculus II | |
| PHYS 1145 & 1145L | General Physics for Life Sciences I and General Physics for Life Sciences I Lab | 4 |
| PHYS 1146 & 1146L | General Physics for Life Sciences II and General Physics for Life Sciences II Lab | 4 |
| Biology Block Electives [1] | | 22-24 |
| **Total Credits** | | **67-71** |

[1] Various upper-level courses may be double-counted toward the departmental concentrations in evolution, ecology and biodiversity, health and human biology, marine science or molecular biology

## Biology Block Electives and Additional Requirements

After completion of the General Biology sequence (BIOL 1171, BIOL 1172, BIOL 1173), a minimum of six biology elective courses and a capstone experience (described below) are required. To ensure breadth of exposure, at least one biology elective must be taken from each of the following three blocks. The three remaining biology course electives may be any 2000 or 3000 level courses listed below. Four of the six biology electives taken during the sophomore (second semester) through senior years must include a laboratory component.

| Code | Title | Credits |
|---|---|---|
| **Molecular, Cell, and Developmental Biology Block** | | |
| BIOL 2261 | Genetics | 4 |
| BIOL 3327 | Cell Biology | 4 |
| BIOL 3342 | Developmental Biology | 4 |
| BIOL 3352 | Fundamentals of Microbiology | 4 |
| BIOL 3354 | Molecular Biology | 3 |
| BIOL 3357 | General Virology | 3 |
| **Biochemistry and Physiology Block** | | |
| BIOL 1107 & BIOL 1108 | Human Anatomy and Physiology I and Human Anatomy and Physiology II [2] | 8 |
| BIOL 2262 | Human Physiology | 4 |
| BIOL 3312 | Fundamentals of Neurobiology | 3 |
| BIOL 3314 | Endocrinology | 3 |
| BIOL 3315 | Anatomy: Form and Function | 3 |
| BIOL 3324 | Biochemistry I | 3 |
| BIOL 3325 | Biochemistry II | 3 |
| BIOL 3356 | Immunology | 3 |
| **Ecology, Evolution, and Environmental Science Block** | | |
| BIOL 2218 | Vertebrate Zoology | 3 |
| BIOL 2260 | Ecology | 4 |
| BIOL 3319 | Zoology Field Experience | 3 |
| BIOL 3362 | Marine Invertebrate Zoology | 4 |
| BIOL 3364 | Freshwater Ecology | 4 |
| BIOL 3365 | Evolutionary Biology | 4 |
| BIOL 3366 | Ornithology | 4 |
| BIOL 3372 | Environmental Toxicology | 4 |

[2] BIOL 1107 and BIOL 1108 may be taken by students pursuing allied health programs, where this course is required. This full-year sequence will count as one Biochemistry and Physiology block upper-level course with lab; however, they *cannot* count for the major if BIOL 2262 Human Physiology has been taken previously and will instead be recorded as extra biology electives. Permission of the department chair is required.

The choice of block electives and general electives inside or outside the department varies according to a student's career objective and interest. Students make their choices after consultation with appropriate department advisors. Students interested in molecular biology may, for example, take advanced courses to fulfill a concentration in molecular biology.

Students interested in graduate, medical, dental, or allied health schools may select electives that meet the requirements for admission to graduate or professional schools. Students interested in science writing or teaching in biology may choose to earn minors in English or education.

## Capstone Seminar

During their capstone experience, students connect the diverse experience and knowledge they have acquired as biology majors, focusing these skills on examining in depth, a specific topic. In a small class setting (10-12 students maximum), students and the professor delve deeply into the chosen topic, assessing the peer-reviewed literature and most current trends around the particular subject. Students bring their breadth of knowledge to the discussion, and apply what they have learned over the course of their academic training to critically analyze the arguments and experiments presented in the literature. In most cases, students will be responsible for presenting a paper to the class, driving the content of discussion and debate with their fellow students and instructor. The capstone is a reading intensive experience, and, by

definition, shows that the biology major is able to synthesize and apply their knowledge to examine interesting questions. Students must enroll in this capstone seminar course (BIOL 4999) during their senior year. See course descriptions for topics.

## Research and Internship Experience

Faculty research specializations provide opportunities for qualified students to participate in laboratory research, field research or library investigations in their chosen interest areas under a professor's guidance. Internships at off-campus institutions can also be arranged for qualified students. These opportunities expand and enhance the biology program's numerous possibilities for individualization.

Students intending to continue their studies in graduate school should consider participating in two or more terms of research. All on-campus research experiences require pre-arrangement with a faculty research advisor.

Off-campus research or internship experiences require an on-campus faculty mentor and approval from the department chair or internship director. Prior consultation is required to assure that the particular activity meets the requirements of the biology major curriculum.

The following research and internship experiences are extra courses and do not count towards the biology major degree requirements:

| Code | Title | Credits |
|---|---|---|
| BIOL 4971 | Biology Research I | 1-3 |
| BIOL 4972 | Biology Research II | 1-3 |
| BIOL 4973 | Biology Research III | 1-3 |
| BIOL 4974 | Biology Research IV | 1-3 |
| BIOL 4975 | Biology Research V | 1-3 |
| BIOL 4976 | Biology Research VI | 1-3 |
| BIOL 4981 | Internship | 1-3 |
| BIOL 4982 | Internship | 1-3 |

## Biology Major with a Concentration in Evolution, Ecology, and Biodiversity

This concentration is intended for the cohort of students interested in pursuing academic and career paths in evolution, ecology, or conservation biology. Interested students should consult with Dr. Tod Osier for advisement and completion of appropriate paperwork.

As part of the six electives noted, students take four courses in the following areas:

| Code | Title | Credits |
|---|---|---|
| BIOL 2260 | Ecology | 4 |
| BIOL 3365 | Evolutionary Biology | 4 |
| Select one biodiversity course from the following: | | 3-4 |
| BIOL 2218 | Vertebrate Zoology | |
| BIOL 3362 | Marine Invertebrate Zoology | |
| BIOL 3366 | Ornithology | |
| Select one capstone course related to a topic in ecology, evolutionary biology, or conservation/diversity, or any other Ecology, Evolution, and Environmental Science Block course | | 3-4 |
| **Total Credits** | | **14-16** |

## Biology Major with a Concentration in Health and Human Biology

This concentration may be of interest to pre-health students, most of whom already select this set of courses as prerequisites or highly recommended courses for post-graduate programs (i.e. medicine, dentistry, veterinary science, pharmacy, physical therapy, physician's assistant, etc). Interested students should consult with Dr. Anita Fernandez for advisement and completion of appropriate paperwork.

As part of the six electives noted, students take four courses in the following areas:

| Code | Title | Credits |
|---|---|---|
| Select one course in physiology: | | 3-4 |
| BIOL 1107 & BIOL 1108 | Human Anatomy and Physiology I and Human Anatomy and Physiology II | |
| BIOL 2262 | Human Physiology | |
| BIOL 3312 | Fundamentals of Neurobiology | |
| BIOL 3314 | Endocrinology | |
| BIOL 3315 | Anatomy: Form and Function | |
| Select one course in metabolism: | | 3 |
| BIOL 3324 | Biochemistry I | |
| BIOL 3325 | Biochemistry II | |
| Select one course in cell biology or genetics: | | 4 |
| BIOL 2261 | Genetics | |
| BIOL 3327 | Cell Biology | |
| BIOL 3342 | Developmental Biology | |
| Select one course in immunity and infection: | | 3-4 |
| BIOL 3352 | Fundamentals of Microbiology | |
| BIOL 3356 | Immunology | |
| BIOL 3357 | General Virology | |
| **Total Credits** | | **13-15** |

## Biology Major with a Concentration in Marine Biology

As part of the six electives noted, students take four courses from the marine sciences biology block. Interested students should consult with Dr. Shannon Gerry for advisement and completion of appropriate paperwork. Courses double-count to fulfill major block requirements.

| Code | Title | Credits |
|---|---|---|
| Select two courses from the following: | | 6 |
| BIOL 1078 | Introduction to Marine Science | |
| BIOL 3362 | Marine Invertebrate Zoology | |
| BIOL 4999F | Senior Capstone Seminar: Coral Reef Ecology | |
| or BIOL 4999G | Senior Capstone Seminar: Ecology of the North Atlantic Coast | |
| or BIOL 4999K | Senior Capstone Seminar: Ichthyology | |
| Remaining one to two courses may be fulfilled by 3-6 credits of either research or internship: | | |
| BIOL 4971 | Biology Research I | |
| BIOL 4972 | Biology Research II | |
| BIOL 4973 | Biology Research III | |

| | | |
|---|---|---|
| BIOL 4974 | Biology Research IV | |
| BIOL 4975 | Biology Research V | |
| BIOL 4976 | Biology Research VI | |
| BIOL 4981 | Internship | |
| BIOL 4982 | Internship | |
| **Total Credits** | | **6** |

# Biology Major with a Concentration in Molecular Biology

As part of the six electives noted, students take four courses from the molecular, cell, and developmental biology block. BIOL 3325 Biochemistry II and BIOL 3356 Immunology may also be accepted. BIOL 3354 Molecular Biology is required. Interested students should consult with Dr. Shelley Phelan for advisement and completion of appropriate paperwork.

# Biology Major with a Minor in Educational Studies and the Five-Year Teacher Education Program

Biology majors who elect a minor in Educational Studies and who have been admitted to the 5-year Integrated Bachelors-Masters Degree and Teacher Certification program should consult with Anthony DeCristofaro, education advisor, and Dr. Emily Smith or Dr. Alyson Martin, co-directors of the 5-year Teacher Preparation Program, to ensure that appropriate thought and reflection on their choices for upper division biology curriculum be made in assuring the best outcome for this unique 5-year program.