# B.S./M.S. IN BIOLOGY

## Overview

The 5-year BS/MS degree in the Department of Biology is designed for students who are engaged in research and considering a career in biological sciences. Over the course of their senior year, plus one additional year of graduate study, students in the program will take graduate level courses, conduct independent research, and write a Masters of Science thesis.

The first step in this process is for the student and a faculty member to agree on a suitable research project. Students should consider talking with several faculty members to discuss possible projects before settling on a research topic. The Director of the Biology BS/MS program can assist the student in finding a participating faculty mentor in Biology. For at least two semesters of their undergraduate studies, the student must have enough time in their schedule to devote to research <BIL 495, BIL 496, BIL 497>. This is the equivalent of a 2-credit laboratory (6 hours per week), but if the student is enthusiastic about his/her project, he/she will want to spend more time on it than that. Applications to the program are evaluated at the end of the Junior year, so the student should begin research in his/her Sophomore year.

In addition to the requirements for the Bachelor of Science, a student must complete specific courses/seminars, as listed under Curriculum Requirements in preparation for their year of graduate study.

**Timeline**:

Freshman/Sophomore/Junior year: Find a research mentor, register with the Office of Undergraduate Research and begin your research project. Enroll in Projects in Biology <BIL 495, BIL 496, BIL 497>. Notify the Program Director of your intent.

Junior year: Apply to the program in the fall semester. Continue your research project.

Senior year: Complete the requirements for the B.S. and take one 3 credit Masters-level course each semester. Attend the Biology Departmental Seminar. Present your research findings at the Research, Creativity and Innovation Forum in the spring semester.

Masters year: Take 12-15 credits of Masters coursework each semester. Finish your lab research, write and defend your thesis.

## Curriculum Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **BS IN BIOLOGY REQUIREMENTS (121 CREDIT HOURS)** | | |
| **Biology Core Courses** | | **22** |
| Two semesters of introductory biology plus labs are required, usually taken in the first year: | | |
| BIL 150 | General Biology | |
| BIL 151 | General Biology Laboratory | |
| or BIL 153 | Introductory Biology/Chemistry Laboratory I | |
| BIL 160 | Evolution and Biodiversity | |
| BIL 161 | Evolution and Biodiversity Laboratory | |
| or BIL 163 | Introductory Biology/Chemistry Laboratory II | |
| Select one of the following three Options for upper level required biology core courses: | | |
| Option One: This option is recommended for students interested in medical school, other health sciences, cell, molecular and developmental biology. | | |
| BIL 250 | Genetics | |
| BIL 255 | Cellular and Molecular Biology | |
| BIL 360 | Comparative Physiology | |
| BIL 330 | Ecology | |
| or BIL 320 | Evolutionary Biology | |
| Option Two: This option is recommended for students interested in ecology, evolution, biodiversity and conservation. | | |
| BIL 250 | Genetics | |
| BIL 320 | Evolutionary Biology | |
| BIL 330 | Ecology | |
| BIL 255 | Cellular and Molecular Biology | |
| or BIL 360 | Comparative Physiology | |
| Option Three: | | |
| BIL 250 | Genetics | |
| BIL 255 | Cellular and Molecular Biology | |

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| BIL 330 | Ecology | |
| BIL 360 | Comparative Physiology | |
| **Additional BIL electives** | | **12** |
| At least one BIL elective must be a CAPSTONE course. Capstone courses can be located in Class Search under "Additional Search Criteria", subheading "Class Attributes". Seminars in Biology (BIL 374, BIL 375, and BIL 402) are capstones. | | |
| At least four credit hours of the following must be taken for the B.S./M.S. in Biology program. A maximum of six credit hours may be applied as electives towards the B.S. in Biology. | | |
| BIL 495 | Projects in Biology | |
| BIL 496 | Projects in Biology | |
| BIL 497 | Projects in Biology | |
| Two biology laboratory or field courses beyond <BIL 151 or BIL 153> and <BIL 161 or BIL 163> are required as part of the additional BIL electives. An approved laboratory/field course at the 300 level or higher in departments other than Biology (e.g., BMB, MIC, MSC, NEU) can be counted as one of the two required lab courses. Projects in Biology <BIL 495, BIL 496 or BIL 497> may be counted as one of the two required lab courses. Check with the Department of Biology to confirm that a specific course is allowed to fulfill this requirement. | | |
| At least six credit hours of graduate courses in Biology (BIL 600-level) must be taken in the Senior year. | | |
| Up to eight credit hours toward the major may be selected from courses with a biological topic and numbered 300 or higher in MBE, MES, MSC, or OCE. | | |
| A maximum of two credit hours of the following may be applied towards the major | | |
| BIL 371 | Readings in Biology | |
| BIL 372 | Readings in Biology | |
| A maximum of three total credit hours from the following courses may be applied towards the major. Any course in this list may be taken only once to count towards the major. However, these courses may be taken additional times for general elective credit only. | | |
| BIL 281 | Undergraduate Learning Internship in Biology | |
| BIL 381 | Workshop Leaders in Biology I [1] | |
| BIL 382 | Workshop Leaders in Biology II | |
| BIL 481 | Undergraduate Teaching Assistant Training in Biology | |
| BIL 482 | PRISM Teaching Fellow | |
| **Chemistry** | | |
| Three semesters (16 credits) of chemistry are required for the biology major. | | 16 |
| CHM 121<br>& CHM 113 | Principles of Chemistry<br>and Chemistry Laboratory I | |
| CHM 221<br>& CHM 205 | Introduction to Structure and Dynamics<br>and Chemical Dynamics Laboratory | |
| CHM 222<br>& CHM 206 | Organic Reactions and Synthesis<br>and Organic Reactions and Synthesis Laboratory | |
| **Statistics or Computer Language/Programming** | | |
| Select one statistics or one computer language/programming course from the following: [2] | | 3 |
| BIL 511 | Advanced Biostatistics | |
| ECS 204 | Environmental Statistics | |
| MSC 204 | Environmental Statistics | |
| MTH 224 | Introduction to Probability and Statistics | |
| PSY 291 | Introduction to Biobehavioral Statistics | |
| PSY 292 | Introduction to Biobehavioral Statistics Section B | |
| CSC 120 | Computer Programming I | |
| **Physics** | | |
| Select one of the following Options: | | 10-11 |
| Option One: | | |
| PHY 101<br>& PHY 106 | College Physics I<br>and College Physics Laboratory I | |
| PHY 102<br>& PHY 108 | College Physics II<br>and College Physics Laboratory II | |
| Option Two: | | |

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| PHY 201<br>& PHY 106 | University Physics I for the Sciences<br>and College Physics Laboratory I | |
| PHY 202<br>& PHY 108 | University Physics II for the Sciences<br>and College Physics Laboratory II | |
| Option Three: | | |
| PHY 211<br>& PHY 106 | University Physics I for PRISM<br>and College Physics Laboratory I | |
| PHY 212<br>& PHY 108 | University Physics II for PRISM<br>and College Physics Laboratory II | |
| Option Four: | | |
| PHY 221 | University Physics I | |
| PHY 222<br>& PHY 224 | University Physics II<br>and University Physics II Lab | |
| PHY 223<br>& PHY 225 | University Physics III<br>and University Physics III Lab | |
| **Minor** | | **1-16** |
| Total credit hours for the minor will vary by department. | | |
| The CHM requirement for the BS in biology fulfills either 12 or 15 (depending on which option is selected) of the 16 credits necessary for the minor in Chemistry. To complete the minor in Chemistry, only 1-4 additional credits in CHM are required beyond those necessary for the BS in Biology. | | |
| **General Education Requirements** | | |
| Written Communication Skills: | | |
| WRS 105 | First-Year Writing I | 3 |
| ENG 106 | Writing About Literature and Culture | 3 |
| or WRS 106 | First-Year Writing II | |
| or WRS 107 | First-Year Writing II: STEM | |
| Quantitative Skills: | | |
| MTH 161 | Calculus I (This course will fulfill the quantitative skills proficiency requirement.) | 4 |
| Areas of Knowledge: | | |
| Arts and Humanities Cognate | | 9 |
| People and Society Cognate | | 9 |
| STEM Cognate (9 credits) (fulfilled through the major) | | |
| **Additional Requirements** | | |
| MTH 162 | Calculus II | 4 |
| Language Courses | | 3-9 |
| Electives | | 25-0 |
| **MS IN BIOLOGY REQUIREMENTS (30 CREDIT HOURS)** | | |
| In the fifth year, 12-15 graduate-level courses in Biology should be taken each semester. | | |
| Required graduate courses for the B.S./M.S. in Biology program. Some of these may be taken during the Senior year of the B.S. | | |
| BIL 610 | Lab Group Meeting | 1 |
| BIL 612 | Graduate Core I | 3 |
| BIL 613 | Graduate Core II | 3 |
| BIL 616 | Professional Skills I | 1 |
| BIL 678 | Current Topics in Biological Research - DVP | 1 |
| BIL 810 | Master's Thesis | 6 |
| BIL 820 | Research in Residence - Master's Thesis | 1 |
| Graduate-level (>600) electives in Biology | | 16-24 |
| **Total Credit Hours** | | **151** |

[1] A maximum of one credit hour may be applied towards the major or minor. These courses may be taken more than once each for *general elective credit only*, but only two credits from these options may count towards the major or minor.

[2] This will fulfill the mathematics/statistics/computer programming requirement under the College of Arts and Sciences General degree requirements for the Bachelor of Science.

# Suggested Plan of Study

| | | |
|---|---|---|
| **Year One** | | |
| **Fall** | | **Credit Hours** |
| BIL 150 | General Biology | 4 |
| BIL 151 or 153 | General Biology Laboratory<br>or Introductory Biology/Chemistry Laboratory I | 1 |
| CHM 121 | Principles of Chemistry | 4 |
| CHM 113 | Chemistry Laboratory I | 1 |
| MTH 161 | Calculus I | 4 |
| WRS 105 | First-Year Writing I | 3 |
| | **Credit Hours** | **17** |
| **Spring** | | |
| BIL 160 | Evolution and Biodiversity | 4 |
| BIL 161 or 163 | Evolution and Biodiversity Laboratory<br>or Introductory Biology/Chemistry Laboratory II | 1 |
| CHM 221 | Introduction to Structure and Dynamics | 4 |
| CHM 205 | Chemical Dynamics Laboratory | 1 |
| ENG 106, WRS 106, or WRS 107 | Writing About Literature and Culture<br>or First-Year Writing II<br>or First-Year Writing II: STEM | 3 |
| MTH 162 | Calculus II | 4 |
| | **Credit Hours** | **17** |
| **Year Two** | | |
| **Fall** | | |
| BIL 250 or 255 | Genetics<br>or Cellular and Molecular Biology | 3 |
| CHM 222 | Organic Reactions and Synthesis | 4 |
| CHM 206 | Organic Reactions and Synthesis Laboratory | 2 |
| Language 101 | | 3 |
| Statistics or Computer Science Course | | 3 |
| Arts and Humanities Cognate Course | | 3 |
| | **Credit Hours** | **18** |
| **Spring** | | |
| BIL 250 or 255 | Genetics<br>or Cellular and Molecular Biology | 3 |
| BIL 330 or 320 | Ecology<br>or Evolutionary Biology | 3 |
| BIL 374, 375, or 402 | Seminar in Biology<br>or Seminar in Biology<br>or Seminar in Biology | 1 |
| BIL 495 | Projects in Biology | 2 |
| Language 102 | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Three** | | |
| **Fall** | | |
| BIL 250, 255, or 360 | Genetics<br>or Cellular and Molecular Biology<br>or Comparative Physiology | 3 |

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|---|---|---|
| BIL 330 or 320 | Ecology<br>or Evolutionary Biology | 3 |
| PHY 101, 201, or 211 | College Physics I<br>or University Physics I for the Sciences<br>or University Physics I for PRISM | 4 |
| PHY 106 | College Physics Laboratory I | 1 |
| People and Society Cognate course | | 3 |
| Language 2XX | | 3 |
| | **Credit Hours** | **17** |
| **Spring** | | |
| Biology Lab/Field course | | 1-3 |
| BIL 496 | Projects in Biology | 2 |
| PHY 102, 202, or 212 | College Physics II<br>or University Physics II for the Sciences<br>or University Physics II for PRISM | 4 |
| PHY 108 | College Physics Laboratory II | 1 |
| Arts and Humanities Cognate (WRI) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **14-16** |
| **Year Four** | | |
| **Fall** | | |
| BIL 612 | Graduate Core I | 3 |
| BIL Elective | | 2 |
| Arts and Humanities Cognate | | 3 |
| Elective (WRI) | | 3 |
| BIL 375, 374, or 402 | Seminar in Biology<br>or Seminar in Biology<br>or Seminar in Biology | 1 |
| People and Society Cognate course (WRI) | | 3 |
| | **Credit Hours** | **15** |
| **Spring** | | |
| BIL 613 | Graduate Core II | 3 |
| Elective (WRI) | | 3 |
| People and Society Cognate | | 3 |
| Elective | | 1-3 |
| Elective | | 3 |
| | **Credit Hours** | **13-15** |
| **Year Five** | | |
| **Fall** | | |
| BIL 610 | Lab Group Meeting | 1 |
| BIL 616 | Professional Skills I | 1 |
| BIL 810 | Master's Thesis | 6 |
| Graduate Electives | | 5-8 |
| | **Credit Hours** | **13-16** |
| **Spring** | | |
| BIL 611 | Lab Group Meeting | 1 |
| BIL 678 | Current Topics in Biological Research - DVP | 1 |
| BIL 820 | Research in Residence - Master's Thesis | 1 |
| Graduate Electives | | 9-12 |
| | **Credit Hours** | **12-15** |
| | **Total Credit Hours** | **151-161** |