BIOLOGY UNDERGRADUATE MAJOR (BS, HBS)

This major offers the following option(s):

- Genetics (http://catalog.oregonstate.edu/college-departments/science/school-life-sciences/integrative-biology/biology-bs-hbs/genetics-option/)
- Physiology and Behavior (http://catalog.oregonstate.edu/college-departments/science/school-life-sciences/integrative-biology/biology-bs-hbs/physiology-behavior-option/)
- Pre-Dentistry/Biology (http://catalog.oregonstate.edu/college-departments/science/school-life-sciences/integrative-biology/biology-bs-hbs/pre-dentistrybiology-option/)
- Pre-Education Biology (http://catalog.oregonstate.edu/college-departments/science/school-life-sciences/integrative-biology/biology-bs-hbs/pre-education-biology-option/)
- Pre-Medicine/Biology (http://catalog.oregonstate.edu/college-departments/science/school-life-sciences/integrative-biology/biology-bs-hbs/pre-medicinebiology-option/)
- Pre-Veterinary Medicine (http://catalog.oregonstate.edu/college-departments/science/school-life-sciences/integrative-biology/biology-bs-hbs/pre-veterinary-medicine-option/)

Also available at OSU-Cascades.

Administered by the Department of Integrative Biology under the School of Life Sciences.

The undergraduate BS degree in Biology is designed for students seeking an interdisciplinary background in the life sciences. The major couples a comprehensive biological, physical and quantitative sciences core with a variety of electives that can be catered to meet diverse professional goals. Undergraduate research, internship, teaching and study abroad experience are strongly recommended, and credits can be integrated with major requirements. Biology majors receive excellent training for graduate and professional programs.


Major Code: 509

- Explain and apply the fundamental concepts of the biological sciences, including inquiry in these four areas: PO1-A Cell Biology and Biochemistry; PO1-B Molecular Biology and Genetics; PO1-C Organismal Biology; and PO1-D Ecology and Evolution.
- Explain and apply the fundamental concepts in cell biology and biochemistry.
- Explain and apply the fundamental concepts in molecular biology and genetics.
- Explain and apply fundamental concepts in organismal biology.
- explain and apply fundamental concepts in population genetics, evolution and ecology.
- Apply the process of science through three different aspects.
- Access primary literature, identify relevant works for a particular topic, and evaluate the scientific content of these works.
- Formulate testable hypotheses based on observation, gather data to address these hypotheses and analyze those data to assess the degree to which their hypothesis is supported.
- Employ fundamental quantitative and statistical principles to present and critique scientific findings.
- Communicate scientific information through effective formal and informal writing and speaking in a format used by practicing scientists.
- Integrate and analyze information across levels of organization ranging from biochemistry and molecular biology to ecosystems within the biological sciences to formulate arguments and critically evaluate scientific claims.
- Conduct background research and apply fundamental biological science principles to make informed decisions on socio-scientific issues.

Students in the Biology major must complete BI 221, BI 222 and BI 223 (or the honors version of this series) with a C– or better to continue on to upper-division Biology (BI) and Zoology (Z) coursework. Students must also complete CH 231/CH 261, CH 232/CH 262 or CH 233/CH 263 and CH 331 and CH 332 with a C– or better to continue on to upper-division Chemistry (CH) coursework.

Students majoring in Biology cannot seek a dual or double major in Biochemistry and Biophysics, Biochemistry and Molecular Biology, Biohealth Sciences, Microbiology or Zoology.

Declaring an option can modify the statistics and elective areas of the major. For further information, see MyDegrees or the Integrative Biology (http://ib.oregonstate.edu) website.

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<thead>
<tr>
<th>Code</th>
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<tr>
<td>BI 197</td>
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<tr>
<td>or BI 198</td>
<td>PROFESSIONAL DEVELOPMENT I: BIOLOGY AND ZOOLOGY</td>
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<tr>
<td>BI 298</td>
<td>PROFESSIONAL DEVELOPMENT FOR BIOLOGISTS II</td>
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Select one BCC course from the following or see option:

- Biology and Society
- Electives
- Senior Biology Major Field Test
- MB 303
- MB 302
- BI 445
- BB 314
- BI 223 & BI 222
- BI 221

These courses are arranged in the order they are generally taken:

### Biological Sciences Core

- BI 221 *PRINCIPLES OF BIOLOGY CELLS* 12
- & BI 222 and *PRINCIPLES OF BIOLOGY ORGANISMS* 12
- & BI 223 and *PRINCIPLES OF BIOLOGY POPULATIONS* (or the honors version of this series) 12

- BI 370 ECOLOGY 3
- BI 311 GENETICS 4
- BB 314 CELL AND MOLECULAR BIOLOGY 4
- BI 445 EVOLUTION 3
- MB 302 GENERAL MICROBIOLOGY 3
- MB 303 GENERAL MICROBIOLOGY LABORATORY 2

### Senior Biology Major Field Test

- BI 498 SENIOR BIOLOGY FIELD TEST 2 0

### Electives 3

Select one BCC course from the following or see option:

- AEC 351 *NATURAL RESOURCE ECONOMICS AND POLICY* 3-4
- AEC 352/ECON 352 *ENVIRONMENTAL ECONOMICS AND POLICY* 3-4
- BB 331 *INTRODUCTION TO MOLECULAR BIOLOGY* 3-4
- BB 332 *MOLECULAR MEDICINE* 3-4
- BI 175 *GENOMES, IDENTITIES AND SOCIETIES* 3-4
- BI 301 *HUMAN IMPACTS ON ECOSYSTEMS* 3-4
- BI 306 *ENVIRONMENTAL ECOLOGY* 3-4
- BI 345 *INTRODUCTION TO EVOLUTION* 3-4
- BI 347 *OCEANS IN PERIL* 3-4
- BI 348 *HUMAN ECOLOGY* 3-4
- BI 420 *VIRUSES IN MODERN SOCIETY* 3-4
- BOT 324 *FUNGI IN SOCIETY* 3-4
- FES 435/TOX 435 *GENES AND CHEMICALS IN AGRICULTURE: VALUE AND RISK* 3-4
- FW 350 *ENDANGERED SPECIES, SOCIETY AND SUSTAINABILITY* 3-4
- H 312 *HIV/AIDS AND STS IN MODERN SOCIETY* 3-4
- HSTS 416 *HISTORY OF MEDICINE PRE-1800* 3-4
- MB 330 *DISEASE AND SOCIETY* 3-4
- PHL 443/REL 443 *WORLD VIEWS AND ENVIRONMENTAL VALUES* 3-4
- Z 349 *BIODIVERSITY CAUSES, CONSEQUENCES, AND CONSERVATION* 3-4

### Baccalaureate Core Communications

- COMM 111 *PUBLIC SPEAKING* 3

### Baccalaureate Core Writing II

- WR 327 *TECHNICAL WRITING* 3
- or WR 362 *SCIENCE WRITING* 3

### Mathematics and Statistics Core

- MTH 251 *DIFFERENTIAL CALCULUS* and INTEGRAL CALCULUS 8
- & MTH 252 *CALCULUS AND PROBABILITY FOR THE LIFE SCIENCES I* and CALCULUS AND PROBABILITY FOR THE LIFE SCIENCES II 8

### Chemistry Core

- CH 231 GENERAL CHEMISTRY 5
- & CH 261 and *LABORATORY FOR CHEMISTRY 231* 5
- CH 232 GENERAL CHEMISTRY 5
- & CH 262 and *LABORATORY FOR CHEMISTRY 232* 5
- CH 233 GENERAL CHEMISTRY 5
- & CH 263 and *LABORATORY FOR CHEMISTRY 233* 5
- CH 331 ORGANIC CHEMISTRY 12
- & CH 332 and ORGANIC CHEMISTRY 12
- & CH 337 and ORGANIC CHEMISTRY LABORATORY 12
- BB 450 GENERAL BIOCHEMISTRY 7
- & BB 451 and GENERAL BIOCHEMISTRY 7

### Physics or Computer Science and Quantitative Applications

Select one of the following tracks or see option: 14-16

#### Track I: Physics

- PH 201 *GENERAL PHYSICS* 3-4
- & PH 202 *GENERAL PHYSICS* 3-4
- & PH 203 *GENERAL PHYSICS* (required for most human health professions) 3-4

#### Track II: Computer Science and Quantitative Applications

- CS 201 COMPUTER PROGRAMMING FOR NON-CS MAJORS 3-4
- or CS 161 INTRODUCTION TO COMPUTER SCIENCE I 3-4
- BDS 211 USE AND ABUSE OF DATA: CRITICAL THINKING IN SCIENCE 3-4
- or CS 162 INTRODUCTION TO COMPUTER SCIENCE II 3-4

Select two additional courses from the following:

- BB 485 APPLIED BIOINFORMATICS 3-4
- BDS 491 CAPSTONE PROJECTS IN BIOLOGICAL DATA SCIENCE I 3-4
- BI 456 PHYLOGENETICS 3-4
- BI 481 BIOGEOGRAPHY 3-4
- BI 483 POPULATION BIOLOGY 3-4
- BOT 458 ECOSYSTEMS GENOMICS 3-4
- BOT 460 FUNCTIONAL GENOMICS 3-4
- BOT 475 COMPARATIVE GENOMICS 3-4
- BOT 476 INTRODUCTION TO COMPUTING IN THE LIFE SCIENCES 3-4
- FW 433 POPULATION DYNAMICS FOR CONSERVATION 3-4
- GEOG 360 GISCIENCE I: GEOGRAPHIC INFORMATION SYSTEMS AND THEORY 3-4
- GEOG 361 GISCIENCE II: ANALYSIS AND APPLICATIONS 3-4
- or GEOG 362 GIS AND SPATIAL DATA SCIENCE 3-4
- OC 449 ECOLOGICAL THEORIES IN BIOLOGICAL AND FISHERIES OCEANOGRAPHY DATA 3-4
- ST 431 SAMPLING METHODS 3-4
- ST 435 QUANTITATIVE ECOLOGY 3-4

Other courses by approval

### Organismal Biology

Select one course from the following or see option: 3-5

- BI 427 PALEOBIOLOGY 3-5
- BOT 321 PLANT SYSTEMATICS 3-5
- BOT 416 AQUATIC BOTANY 3-5
- BOT 461 MYCOLOGY 3-5
- Z 361 INVERTEBRATE BIOLOGY 3-5
- & Z 362 and INVERTEBRATE BIOLOGY LABORATORY 3-5
- Z 371 VERTEBRATE BIOLOGY 3-5
- & Z 372 and VERTEBRATE BIOLOGY LABORATORY 3-5
- Z 422 COMPARATIVE/FUNCTIONAL VERTEBRATE ANATOMY 3-5
- Z 461 MARINE AND ESTUARINE INVERTEBRATE ZOOLOGY (taught at Hatfield Marine Science Center) 3-5
- Z 477 AQUATIC ENTOMOLOGY 3-5

### Physiology

Select one course from the following or see option: 3-5

- BI 331 ADVANCED HUMAN ANATOMY AND PHYSIOLOGY 3-5
- & BI 341 and ADVANCED HUMAN ANATOMY AND PHYSIOLOGY 3-5
- & BI 332 LABORATORY 3-5
- & BI 342 and ADVANCED HUMAN ANATOMY AND PHYSIOLOGY 3-5
- & BI 343 and ADVANCED HUMAN ANATOMY AND PHYSIOLOGY 3-5

- BOT 331 PLANT PHYSIOLOGY 3-5
- BOT 488 ENVIRONMENTAL PHYSIOLOGY OF PLANTS 3-5
- Z 423 ENVIRONMENTAL PHYSIOLOGY 3-5
- Z 425 EMBRYOLOGY AND DEVELOPMENT 3-5
- Z 431 VERTEBRATE PHYSIOLOGY I 3-5

### Writing Intensive Course (WIC)

Select one course from the following or see option: 3-5

- BI 319 *THEORY, PRACTICE AND DISCOURSE IN THE LIFE SCIENCES* 3-5
Biology Undergraduate Major (BS, HBS)

- **BI 371**  ECOLOGICAL METHODS
- **BI 373**  FIELD METHODS IN MARINE ECOLOGY
- **BOT 232**  FLOWERING PLANTS OF THE WORLD
- **MB 385**  EMERGING INFECTIOUS DISEASES AND EPIDEMICS

**Experiential Learning or Integrative Biology Elective**

Select one of the following two tracks or an option: 3-4

**Track I Experiential Learning Credits**

Select any combination of three credits from the following:

- **BI 309**  TEACHING PRACTICUM (by approval)
- **BI 401**  RESEARCH AND SCHOLARSHIP (by approval)
- **BI 406**  PROJECTS: CURATORIAL ASSISTANT (by approval)
- **BI 409**  ADVANCED TEACHING PRACTICUM (by approval)
- **BI 410**  INTERNSHIP (by approval)
- **OSU international internships (INTL credits)** by approval

**Track II Integrative Biology Course**

Select one course from the following:

- **BI 333**  ADVANCED HUMAN ANATOMY AND PHYSIOLOGY
- **BI 343**  ADVANCED HUMAN ANATOMY AND PHYSIOLOGY LABORATORY
- **BI 353**  PACIFIC NORTHWEST COASTAL ECOSYSTEMS (taught at Hatfield Marine Science Center)
- **BI 358**  SYMBIOSES AND THE ENVIRONMENT
- **BI 375**  FIELD METHODS IN ECOLOGICAL RESTORATION (taught at OSU Cascades)
- **BI 427**  PALEOBIOLOGY (if not used above)
- **BI 450**  MARINE BIOLOGY AND ECOLOGY (taught at Hatfield Marine Science Center)

**Total credits required for graduation** 180

* Baccalaureate Core Course (BCC)

^ Writing Intensive Course (WIC)

1

Alternative series is ST 351, ST 411 and ST 412

2

Biology majors are required to take BI 498, a comprehensive, two-hour Biology Major Field Test (http://ib.oregonstate.edu/advising/MFT-info/), in their final OSU term (or spring term if they will graduate in summer) in order to graduate.

3

Declaring an option will alter the elective categories below, and all options automatically clear the upper-division science electives requirement. See the individual options or MyDegrees for details. Biology and Society electives also count as BCC.

4

BI 450 (taught at Hatfield Marine Science Center) is by application only and may count for other major requirements.

**Major Code: 509**

**Biology - TRACK I**

**First Year**

<table>
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<tr>
<th>Fall</th>
<th>Credits</th>
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<tbody>
<tr>
<td>BI 197 or BI 198</td>
<td>PROFESSIONAL DEVELOPMENT I: HEALTH PROFESSIONS or PROFESSIONAL DEVELOPMENT I: BIOLOGY AND ZOOLOGY</td>
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<td>CH 231 &amp; CH 261</td>
<td>GENERAL CHEMISTRY and LABORATORY FOR CHEMISTRY 231</td>
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<td>MTH 111 or MTH 112</td>
<td>COLLEGE ALGEBRA or ELEMENTARY FUNCTIONS</td>
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<td>HHS 231</td>
<td>LIFETIME FITNESS FOR HEALTH (or PAC Course)</td>
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<td>CH 232 &amp; CH 262</td>
<td>GENERAL CHEMISTRY and LABORATORY FOR CHEMISTRY 232</td>
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<td>MTH 112</td>
<td>ELEMENTARY FUNCTIONS</td>
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<tr>
<td>BI 221</td>
<td>PRINCIPLES OF BIOLOGY: CELLS</td>
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<td>CH 331</td>
<td>ORGANIC CHEMISTRY</td>
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<td>MTH 251 or MTH 227</td>
<td>DIFFERENTIAL CALCULUS or CALCULUS AND PROBABILITY FOR THE LIFE SCIENCES I</td>
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<td>BI 222</td>
<td>PRINCIPLES OF BIOLOGY: ORGANISMS</td>
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<td>CH 332</td>
<td>ORGANIC CHEMISTRY</td>
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<td>ST 351</td>
<td>INTRODUCTION TO STATISTICAL METHODS</td>
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<td>MTH 252 or MTH 228</td>
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<td>PRINCIPLES OF BIOLOGY: POPULATIONS</td>
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<td>CH 337</td>
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<td>INTRODUCTION TO STATISTICAL METHODS</td>
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### Third Year

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<td>BB 450 GENERAL BIOCHEMISTRY</td>
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Select one of the following: 3-4

- BI 311 GENETICS
- BB 314 CELL AND MOLECULAR BIOLOGY
- BI 370 ECOLOGY
- PH 201 *GENERAL PHYSICS 5

Bacc Core 3

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<thead>
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<th>Winter</th>
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<tr>
<td>BB 451 GENERAL BIOCHEMISTRY</td>
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Select one of the following: 3-4

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- BB 314 CELL AND MOLECULAR BIOLOGY
- BI 370 ECOLOGY
- PH 202 *GENERAL PHYSICS 5

Bacc Core 3

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<tr>
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- BI 311 GENETICS
- BB 314 CELL AND MOLECULAR BIOLOGY
- BI 370 ECOLOGY
- BI 445 EVOLUTION
- PH 203 *GENERAL PHYSICS 5

Select one of the following: 3

- Biology and Society
- Organismic Biology
- Physiology
- Writing Intensive Course

Bacc Core 3

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<th>Fourth Year</th>
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- BI 311 GENETICS
- BB 314 CELL AND MOLECULAR BIOLOGY
- BI 370 ECOLOGY
- BI 445 EVOLUTION
- MB 302 GENERAL MICROBIOLOGY 3
- MB 303 GENERAL MICROBIOLOGY LABORATORY 2

Select one of the following: 3

- Biology and Society
- Organismic Biology
- Physiology
- Writing Intensive Course

Electives 4

Bacc Core 3

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- Biology and Society
- Organismic Biology
- Physiology
- Writing Intensive Course

Experiential Learning or Integrative Biology Elective 3

Electives 6-10

Bacc Core 3

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### Biology - TRACK II

#### First Year

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BI 221 *PRINCIPLES OF BIOLOGY: CELLS 4

CH 231 GENERAL CHEMISTRY 5

& CH 261 and *LABORATORY FOR CHEMISTRY 231 3

Bacc Core 3

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<td>BI 222 *PRINCIPLES OF BIOLOGY: ORGANISMS 4</td>
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CH 232 GENERAL CHEMISTRY 5

& CH 262 and *LABORATORY FOR CHEMISTRY 232 3

Two Bacc Core courses 6

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<td>BI 298 PROFESSIONAL DEVELOPMENT FOR BIOLOGISTS II 1</td>
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BI 223 *PRINCIPLES OF BIOLOGY: POPULATIONS 4

CH 233 GENERAL CHEMISTRY 5

& CH 263 and *LABORATORY FOR CHEMISTRY 233 3

MTH 251 or MTH 227 *DIFFERENTIAL CALCULUS OR *CALCULUS AND PROBABILITY FOR THE LIFE SCIENCES I 4

Bacc Core 3

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<th>Second Year</th>
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PH 201 *GENERAL PHYSICS 5

MTH 252 or MTH 228 INTEGRAL CALCULUS OR CALCULUS AND PROBABILITY FOR THE LIFE SCIENCES II 4

Bacc Core 3

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- BI 311 GENETICS
- BB 314 CELL AND MOLECULAR BIOLOGY
- BI 370 ECOLOGY
- CH 332 ORGANIC CHEMISTRY 4
- PH 202 *GENERAL PHYSICS 5

Bacc Core 3

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<td>BI 311 GENETICS</td>
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BB 314 CELL AND MOLECULAR BIOLOGY

BI 370 ECOLOGY

CH 337 ORGANIC CHEMISTRY LABORATORY 4

PH 203 *GENERAL PHYSICS 5

Bacc Core 3

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<td>BI 498 SENIOR BIOLOGY FIELD TEST</td>
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### Biology Undergraduate Major (BS, HBS)

**Total Credits**: 180
### Third Year

#### Fall
- **BB 450** GENERAL BIOCHEMISTRY: 4
- Select one of the following: 3-4
  - **BI 311** GENETICS
  - **BB 314** CELL AND MOLECULAR BIOLOGY
  - **BI 370** ECOLOGY
  - **BI 445** EVOLUTION
- **ST 351** INTRODUCTION TO STATISTICAL METHODS: 4
- **Bacc Core**: 3
- **Credits**: 15

#### Winter
- **BB 451** GENERAL BIOCHEMISTRY: 3
- Select one of the following: 3-4
  - **BI 311** GENETICS
  - **BB 314** CELL AND MOLECULAR BIOLOGY
  - **BI 370** ECOLOGY
  - **BI 445** EVOLUTION
- **ST 352** INTRODUCTION TO STATISTICAL METHODS: 4
- **Bacc Core**: 3
- **Credits**: 14

#### Spring
- Select one of the following: 3-4
  - **BI 311** GENETICS
  - **BB 314** CELL AND MOLECULAR BIOLOGY
  - **BI 370** ECOLOGY
  - **BI 445** EVOLUTION
- Biology and Society
- Organismal Biology
- Physiology
- Writing Intensive Course
- **MB 302** GENERAL MICROBIOLOGY: 3
- **MB 303** GENERAL MICROBIOLOGY LABORATORY: 2
- **Bacc Core**: 3
- **Credits**: 14-15

### Fourth Year

#### Fall
- Select one of the following: 3
  - Biology and Society
  - Organismal Biology
  - Physiology
  - Writing Intensive Course
- **Bacc Core**: 3
- Electives: 6-10
- **Credits**: 14

#### Winter
- Select one of the following: 3
  - Biology and Society
  - Organismal Biology
  - Physiology
  - Writing Intensive Course
- Experiential Learning or Integrative Biology Elective: 3
- Electives: 6-10
- **Credits**: 14

#### Spring
- **BI 498** SENIOR BIOLOGY FIELD TEST: 0
- Select one of the following: 3
  - Biology and Society
  - Organismal Biology
  - Physiology

### Writing Intensive Course
- **Credits**: 8-12
- **Total Credits**: 180-181

### Biology - TRACK III

#### First Year

#### Fall
- **BI 197** PROFESSIONAL DEVELOPMENT I: HEALTH
  or **BI 198** PROFESSIONAL DEVELOPMENT I: BIOLOGY AND ZOOLOGY: 1
- **BI 221** *PRINCIPLES OF BIOLOGY* CELLS: 4
- **CH 231** GENERAL CHEMISTRY
  & **CH 261** *LABORATORY FOR CHEMISTRY 231: 5
- **Bacc Core**: 3
- **HHS 231** *LIFETIME FITNESS FOR HEALTH* (or PAC Course): 1-2
- **Credits**: 15

#### Winter
- **BI 222** *PRINCIPLES OF BIOLOGY* ORGANISMS: 4
- **CH 232** GENERAL CHEMISTRY
  & **CH 262** *LABORATORY FOR CHEMISTRY 232: 5
- Two **Bacc Core courses**: 6
- **Credits**: 15

#### Spring
- **BI 298** PROFESSIONAL DEVELOPMENT FOR BIOLOGISTS II: 1
- **BI 223** *PRINCIPLES OF BIOLOGY* POPULATIONS: 4
- **CH 233** GENERAL CHEMISTRY
  & **CH 263** *LABORATORY FOR CHEMISTRY 233: 5
- **MTH 251** *DIFFERENTIAL CALCULUS* or **MTH 227**
  or **CALCULUS AND PROBABILITY FOR THE LIFE SCIENCES I: 4
- **Bacc Core**: 3
- **Credits**: 17

#### Second Year

#### Fall
- Select one of the following: 3-4
  - **BI 311** GENETICS
  - **BB 314** CELL AND MOLECULAR BIOLOGY
  - **BI 370** ECOLOGY
  - **BI 445** EVOLUTION
  - **CH 331** ORGANIC CHEMISTRY: 4
  - **MTH 252** INTEGRAL CALCULUS
  or **MTH 228**
  or **CALCULUS AND PROBABILITY FOR THE LIFE SCIENCES II: 4
- **Bacc Core**: 3
- **Credits**: 15

#### Winter
- Select one of the following: 3-4
  - **BI 311** GENETICS
  - **BB 314** CELL AND MOLECULAR BIOLOGY
  - **BI 370** ECOLOGY
  - **BI 445** EVOLUTION
  - **CH 332** ORGANIC CHEMISTRY: 4
  - **ST 351** INTRODUCTION TO STATISTICAL METHODS: 4
- **Bacc Core**: 3
- **Credits**: 15

#### Spring
- Select one of the following: 3-4
  - **BI 311** GENETICS
  - **BB 314** CELL AND MOLECULAR BIOLOGY
  - **BI 370** ECOLOGY
  - **BI 445** EVOLUTION

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**Credits** 15

**Third Year**

**Fall**

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**Credits** 16

**Winter**

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**Credits** 14

**Spring**

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**Credits** 14

**Fourth Year**

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**Credits** 13

**Winter**

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**Credits** 14

**Spring**

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**Credits** 15

**Total Credits** 180