BACHELOR OF SCIENCE IN BIOLOGY: CONCENTRATION IN MARINE BIOLOGY AND LIMNOLOGY - QUANTITATIVE REASONING CATEGORY I/II AND ENG 114

120 Total Units Required
Minimum Number of Units in the Major: 57

This roadmap is a suggested plan of study and does not replace meeting with an advisor. Please note that students may need to adjust the actual sequence of courses based on course availability. Please consult an advisor in your major program for further guidance.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td><strong>First Semester</strong></td>
<td></td>
<td></td>
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<tr>
<td>CHEM 115</td>
<td>General Chemistry I: Essential Concepts of Chemistry (Major Lower-Division Core)</td>
<td>5</td>
</tr>
<tr>
<td>ENG 114</td>
<td>Writing the First Year: Finding Your Voice (A2)</td>
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<tr>
<td>MATH 226</td>
<td>Calculus I (Major Lower-Division Core, B4)</td>
<td>4</td>
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<tr>
<td>GE Area A 3</td>
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<tr>
<td><strong>Units</strong></td>
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<td>15</td>
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<tr>
<td><strong>Second Semester</strong></td>
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<tr>
<td>BIOL 230</td>
<td>Introductory Biology I (Major Lower-Division Core)</td>
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<tr>
<td>BIOL 231</td>
<td>Advising for Success as a Biology Major (Major Lower-Division Core)</td>
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<tr>
<td>CHEM 130</td>
<td>General Organic Chemistry (Major Lower-Division Core)</td>
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<tr>
<td>GE Area A</td>
<td></td>
<td>3</td>
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<tr>
<td>GE Area E</td>
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<tr>
<td><strong>Units</strong></td>
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<tr>
<td><strong>Third Semester</strong></td>
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<tr>
<td>BIOL 240</td>
<td>Introductory Biology II 4</td>
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<tr>
<td>Select One (Major Lower-Division Core): 5</td>
<td></td>
<td>4-5</td>
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<tr>
<td><strong>Units</strong></td>
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<tr>
<td><strong>Fourth Semester</strong></td>
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<tr>
<td>BIOL 337</td>
<td>Evolution (Major Upper-Division Core)</td>
<td>3</td>
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Oceanography Elective - Select One  
BIOL 582 Biological Oceanography & Limnology (4 units)
CHEM 680 Chemical Oceanography (3 units)
ERTH 400 Earth Systems I (3 units)
ERTH 434 Coastal Processes (3 units)
ERTH 470 Physical Oceanography (4 units)

GWAR Option - Select One  
BIOL 344GW Research Skills - GWAR (3 units)
BIOL 475GW Herpetology - GWAR (3 units)
BIOL 478GW Ornithology - GWAR (4 units)
BIOL 570GW Biology of Fishes - GWAR (4 units)
BIOL 670GW Ecology and Evolution of Marine Systems I - GWAR (6 units)

Upper-Division Electives (6-7 units)  
BIOL 315 Field Methods in Ecology and Evolution (1 unit)
BIOL 349 Bioethics (3 units) (UD-B, SJ)
BIOL 350 Cell Biology (3 units)
BIOL 356 Honors Genetics (2 units)
BIOL 357 Molecular Genetics (3 units)
BIOL 380 Evolutionary Developmental Biology (3 units)
BIOL 382 Developmental Biology (3 units)
BIOL 391 Microscopy and Photomicrography (2 units)
BIOL 401 General Microbiology (3 units)
BIOL 411 Environmental Microbiology (3 units)
BIOL 460 General Entomology (4 units)
BIOL 470 Natural History of Vertebrates (4 units)
BIOL 482 Ecology (4 units)
BIOL 502 Biology of the Algae (3 units)
BIOL 525 Plant Physiology (3 units)
BIOL 526 Plant Molecular Physiology Laboratory (2 units)
BIOL 530 Conservation Biology (3 units)
BIOL 532 Restoration Ecology (3 units)
BIOL 534 Wetland Ecology (4 units)
BIOL 555 Marine Invertebrate Zoology (4 units)
BIOL 556 Natural History of Marine Invertebrates (4 units)
BIOL 572 Colloquium in Ecology, Evolution, and Conservation (2 units)
BIOL 582 Biological Oceanography & Limnology (4 units)
BIOL 585 Marine Ecology (3 units)
BIOL 586 Marine Ecology Laboratory (2 units)
BIOL 600 Animal Behavior (3 units)
BIOL 607 Conservation and Management of Marine Mammals (3 units)
BIOL 617 Environmental Physiology (3 units)
BIOL 630 Animal Physiology (3 units)
BIOL 631GW Animal Physiology Laboratory - GWAR (4 units)
BIOL 644 LEADeR Service Learning Course: Learners Engaged in Advocating for Diversity in Science (4 units)
or BIOL 654 Peer Assistants for Learning Science (PALS) (4 units)
BIOL 670GW Ecology and Evolution of Marine Systems I - GWAR (6 units)
BIOL 671 Ecology and Evolution of Marine Systems II (6 units)
BIOL 699 Independent Study in Biology (1-3 units)
GEOG 629 Coastal and Marine Applications of GIS (3 units)
MSCI 306 Marine Science Diving and Boating (2 units)

1. ENG 114 can only be taken if you completely Directed Self-Placement (DSP) and select ENG 114; if you choose ENG 104/ENG 105 through DSP you will satisfy A2 upon successful completion of ENG 105 in the second semester; multilingual students may be advised into alternative English courses.

2. Depending on courses completed through Early Start, students in Pathway/Category III or IV may be required to enroll in a support course to complement their Quantitative Reasoning/B4 requirement. There are multiple course options for this pathway. Before enrolling in a B4 course, students should verify their MATH Pathway/Category in their Student Center (http://cms.sfsu.edu/content/student-center/). Information regarding the courses that correspond with your MATH Pathway/Category can be found on the Developmental Studies Office Website (http://developmentalstudies.sfsu.edu/).

3. To avoid taking additional units, it is recommended that you meet SF State Studies (AERM, GP, ES, SJ) and Ethnic Studies requirements within your GE or major.

4. GE Areas B2 (Life Science) and B3 (Laboratory Science) are satisfied upon completion of BIOL 240.

5. Students must take MATH 227 if also taking PHYS 220/PHYS 222.

6. PHYS 111/PHYS 112 are prerequisites for PHYS 121/PHYS 122.
   PHYS 220/PHYS 222 are prerequisites for PHYS 230/PHYS 232.

7. Upper-Division General Education, Physical, and Life Sciences (UD-B) is satisfied upon completion of BIOL 355.

8. Oceanography Elective - Select One
   BIOL 582 Biological Oceanography & Limnology (4 units)
   CHEM 680 Chemical Oceanography (3 units)
   ERTH 400 Earth Systems I (3 units)
   ERTH 434 Coastal Processes (3 units)
   ERTH 470 Physical Oceanography (4 units)

9. GWAR Option - Select One
   BIOL 344GW Research Skills - GWAR (3 units)
   BIOL 475GW Herpetology - GWAR (3 units)
   BIOL 478GW Ornithology - GWAR (4 units)
   BIOL 570GW Biology of Fishes - GWAR (4 units)
   BIOL 670GW Ecology and Evolution of Marine Systems I - GWAR (6 units)

10. Major Upper-Division Electives (6-7 units) - Take One
   SF State Studies or University Elective - Take Three
   GWAR Option - Select One
   Oceanography Elective - Select One
   GE Area UD-D: Upper-Division Social Sciences (Consider SF State Studies Course)
   Major Upper-Division Electives (6-7 units) - Take One
   SF State Studies or University Elective - Take Two

Units  
15-16
15-17
12
Total Units  
120-126