BIOLOGICAL SCIENCES, BACHELOR OF SCIENCE

College of Biological Sciences

The Biological Sciences Major
Departments of Evolution & Ecology; Microbiology & Molecular Genetics; Molecular & Cellular Biology; Neurobiology, Physiology, & Behavior; and Plant Biology

The Program
The Biological Sciences major is broad in concept, spanning the numerous core disciplines of biology. The Bachelor of Science (B.S.) program includes preparatory work in mathematics, general and organic chemistry, physics, and introductory level biology, as well as upper division core classes emphasizing the breadth of biological sciences. Students in the B.S. degree program complete additional upper division biology coursework, for which they can choose classes from a variety of different areas such as molecular biology and genetics, animal behavior, plant growth and development, bioinformatics, marine biology, forensics, and microbiology research and internships are encouraged.

Career Alternatives
The degree program prepares students for admission to graduate schools or professional schools, leading to either a variety of professional health careers or further study in basic and applied areas of biology. They provide suitable preparation for careers in teaching, biological and biotechnological research with various governmental agencies or private companies, government regulatory agencies, environmental consulting, biological illustration and writing, pharmaceutical sales, biological/environmental law, and biomedical engineering.

Faculty Advisor
Lesilee Rose, Ph.D.

Advising
Biology Academic Success Center (BASC) (http://basc.ucdavis.edu/) in 1023 Katherine Esau Science Hall (formerly Sciences Laboratory Building); 530-752-0410.

Teaching Credential Subject Representative
Associate Director of Teacher Education (School of Education); see the Teaching Credential/M.A. Program (https://education.ucdavis.edu/teaching-credentialma/).

Bodega Marine Laboratory Program

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Preparatory Subject Matter</td>
<td></td>
</tr>
<tr>
<td>BIS 002A &amp; BIS 002B &amp; BIS 002C</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Introduction to Biology: Essentials of Life on Earth</td>
<td></td>
</tr>
<tr>
<td></td>
<td>and Introduction to Biology: Principles of Ecology &amp; Evolution</td>
<td></td>
</tr>
<tr>
<td></td>
<td>and Introduction to Biology: Biodiversity &amp; the Tree of Life</td>
<td></td>
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<table>
<thead>
<tr>
<th>Chemistry</th>
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<tbody>
<tr>
<td>Choose the 002 or 004 series:</td>
</tr>
<tr>
<td>CHE 002A &amp; CHE 002B &amp; CHE 002C</td>
</tr>
<tr>
<td>&amp; CHE 002C</td>
</tr>
<tr>
<td>CHE 004A &amp; CHE 004B &amp; CHE 004C</td>
</tr>
<tr>
<td>&amp; CHE 004C</td>
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</table>

| Choose the 008 or 118 series: | 6-12 |
| CHE 008A & CHE 008B | Organic Chemistry: Brief Course |
| & CHE 008B | and Organic Chemistry: Brief Course |
| CHE 118A & CHE 118B & CHE 118C | Organic Chemistry for Health & Life Sciences |
| & CHE 118C | and Organic Chemistry for Health & Life Sciences |

<table>
<thead>
<tr>
<th>Mathematics</th>
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<tbody>
<tr>
<td>Choose the 017 or 021 series:</td>
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<tr>
<td>MAT 017A &amp; MAT 017B &amp; MAT 017C</td>
</tr>
<tr>
<td>&amp; MAT 017C</td>
</tr>
<tr>
<td>MAT 021A &amp; MAT 021B &amp; MAT 021C</td>
</tr>
<tr>
<td>&amp; MAT 021C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Physics</th>
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</thead>
<tbody>
<tr>
<td>PHY 007A &amp; PHY 007B &amp; PHY 007C</td>
</tr>
<tr>
<td>&amp; PHY 007C</td>
</tr>
</tbody>
</table>

Preparatory Subject Matter Subtotal | 56-66 |

Depth Subject Matter

Section 1: Core Curriculum
BIS 101 Genes & Gene Expression 4
BIS 104 Cell Biology 3
BIS 105 Biomolecules & Metabolism 3-6
or BIS 102 Structure & Function of Biomolecules
& BIS 103 Bioenergetics & Metabolism

Section 2: Depth Subject Topics
Choose one from each topic: 21-26

Statistics
STA 100 Applied Statistics for Biological Sciences

Evolution
EVE 100 Introduction to Evolution

Ecology
EVE 101 Introduction to Ecology
ESP 100 General Ecology

Microbiology
Section 3: Laboratory Requirement

Course(s) selected to fulfill the laboratory requirement may also satisfy restricted elective or depth subject matter units (but not both).

Choose course(s) for a minimum total of six hours/week of laboratory or field work from the list of courses below:

Choose two with three hours lab or field work/week:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVE 110</td>
<td>Running, Swimming &amp; Flying</td>
</tr>
<tr>
<td>EVE 140</td>
<td>Paleobotany</td>
</tr>
<tr>
<td>EVE/ENT 180A</td>
<td>Experimental Ecology &amp; Evolution in the Field</td>
</tr>
<tr>
<td>EVE/ENT 180B</td>
<td>Experimental Ecology &amp; Evolution in the Field</td>
</tr>
<tr>
<td>MCB 185</td>
<td>Computer Programming for Biologists</td>
</tr>
<tr>
<td>MIC 103L</td>
<td>Introductory Microbiology Laboratory</td>
</tr>
<tr>
<td>NPB 100L</td>
<td>Neurobiology Laboratory</td>
</tr>
<tr>
<td>NPB 101L</td>
<td>Systemic Physiology Laboratory</td>
</tr>
<tr>
<td>NPB 121L</td>
<td>Physiology of Reproduction Laboratory</td>
</tr>
<tr>
<td>PLB/EVE 108</td>
<td>Plant Biochemistry</td>
</tr>
<tr>
<td>PLB/EVE 119</td>
<td>Population Biology of Invasive Plants &amp; Weeds</td>
</tr>
</tbody>
</table>

Other courses with approval of Faculty Advisor.

Choose one course with six hours lab or field work/week:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>BIS 180L</td>
<td>Genomics Laboratory</td>
</tr>
<tr>
<td>EVE 105</td>
<td>Phylogenetic Analysis of Vertebrate Structure</td>
</tr>
<tr>
<td>EVE 106</td>
<td>Mechanical Design in Organisms</td>
</tr>
<tr>
<td>EVE/PLB 108</td>
<td>Systematics &amp; Evolution of Angiosperms</td>
</tr>
<tr>
<td>EVE 112L</td>
<td>Biology of Invertebrates Laboratory</td>
</tr>
<tr>
<td>EVE 114</td>
<td>Experimental Invertebrate Biology</td>
</tr>
<tr>
<td>EXB 106L/CHA 101L</td>
<td>Human Gross Anatomy Laboratory</td>
</tr>
<tr>
<td>MIC 104L</td>
<td>General Microbiology Laboratory</td>
</tr>
<tr>
<td>MIC 105L</td>
<td>Microbial Diversity Laboratory</td>
</tr>
<tr>
<td>MCB 120L</td>
<td>Molecular Biology &amp; Biochemistry Laboratory</td>
</tr>
<tr>
<td>MCB 140L</td>
<td>Cell Biology Laboratory</td>
</tr>
<tr>
<td>MCB 160L</td>
<td>Principles of Genetics Laboratory</td>
</tr>
<tr>
<td>NPB 141P</td>
<td>(Discontinued)</td>
</tr>
<tr>
<td>PLB/PLS 102</td>
<td>California Floristics</td>
</tr>
<tr>
<td>PLB 105</td>
<td>Developmental Plant Anatomy</td>
</tr>
<tr>
<td>PLB/EVE 108</td>
<td>Systematics &amp; Evolution of Angiosperms</td>
</tr>
<tr>
<td>PLB/PLS 116</td>
<td>Plant Morphology &amp; Evolution</td>
</tr>
<tr>
<td>PLB/PLP 148</td>
<td>Introductory Mycology</td>
</tr>
</tbody>
</table>

Other courses with approval of the Faculty Advisor.

Section 4: Restricted Electives

Choose at least three or more courses for a minimum of 11 units from the list of Approved Upper Division Restrictive Electives and/or laboratory courses. No class or laboratory used to satisfy a Section 1 or a Section 2 course requirement may be used as a restricted elective.

Students may choose any combination of approved courses that align with their academic or career objectives. Up to three of the 11 units may be fulfilled by approved seminar or research courses.

Total Units 11

Approved Seminar/Research Courses (p. 2)

Approved Upper Division Restricted Electives (p. 3)

Total Units 98-116

1 With BASC advisor approval, these combinations these combinations also satisfy the Chemistry requirement: CHE 004A-CHE 002A (3 units w/no lab)-CHE 002B-CHE 002C; CHE 004A-CHE 004B-CHE 002C.
2 With BASC advisor approval, this combination also satisfies the Organic Chemistry requirement: CHE 118A-CHE 008B.
3 With BASC advisor approval, this combination also satisfies the Mathematics requirement: MAT 021A-MAT 017B-MAT 017C; MAT 017A-MAT 021B.

Approved Seminar/Research Courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIS 122P</td>
<td>Population Biology &amp; Ecology/Advanced Laboratory Topics</td>
<td>5</td>
</tr>
<tr>
<td>BIS 123</td>
<td>Undergraduate Colloquium in Marine Science</td>
<td>1</td>
</tr>
<tr>
<td>BIS 133</td>
<td>Collaborative Studies in Mathematical Biology</td>
<td>3</td>
</tr>
<tr>
<td>EVE/ESP 111</td>
<td>Marine Environmental Issues or MMG 191 (PENDING APPROVAL)</td>
<td>1</td>
</tr>
<tr>
<td>MCB 138</td>
<td>Undergraduate Seminar in Biochemistry</td>
<td>1</td>
</tr>
<tr>
<td>MCB 139</td>
<td>Undergraduate Seminar in Biochemistry</td>
<td>2</td>
</tr>
<tr>
<td>MCB 148</td>
<td>Undergraduate Seminar in Cell Biology</td>
<td>2</td>
</tr>
<tr>
<td>MCB 158</td>
<td>Undergraduate Seminar in Developmental Biology</td>
<td>2</td>
</tr>
<tr>
<td>MCB 178</td>
<td>Undergraduate Seminar in Molecular Genetics</td>
<td>1</td>
</tr>
</tbody>
</table>

Courses numbered 189, 190/190C, 192, 194H, and 199 in ABI, ANS, BIS, BIT, ENH, ENT, ETX, EVE, MCB, MIC, MMG, NPB, PLB, PLP, PLS, VEN, WFC, as well as:

BIS 122P | Population Biology & Ecology/Advanced Laboratory Topics | 5     |
| BIS 123 | Undergraduate Colloquium in Marine Science          | 1     |
| BIS 133 | Collaborative Studies in Mathematical Biology       | 3     |
| EVE/ESP 111 | Marine Environmental Issues or MMG 191 (PENDING APPROVAL) | 1     |
| MCB 138 | Undergraduate Seminar in Biochemistry               | 1     |
| MCB 139 | Undergraduate Seminar in Biochemistry               | 2     |
| MCB 148 | Undergraduate Seminar in Cell Biology               | 2     |
| MCB 158 | Undergraduate Seminar in Developmental Biology      | 2     |
| MCB 178 | Undergraduate Seminar in Molecular Genetics          | 1     |

1 With BASC advisor approval, these combinations these combinations also satisfy the Chemistry requirement: CHE 004A-CHE 002A (3 units w/no lab)-CHE 002B-CHE 002C; CHE 004A-CHE 004B-CHE 002C.
2 With BASC advisor approval, this combination also satisfies the Organic Chemistry requirement: CHE 118A-CHE 008B.
3 With BASC advisor approval, this combination also satisfies the Mathematics requirement: MAT 021A-MAT 017B-MAT 017C; MAT 017A-MAT 021B.
### Approved Upper Division Restricted Electives

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANG 105</td>
<td>Horse Genetics</td>
<td>3</td>
</tr>
<tr>
<td>ANG 107</td>
<td>Genetics &amp; Animal Breeding</td>
<td>5</td>
</tr>
<tr>
<td>ANS 104</td>
<td>Principles &amp; Applications of Domestic Animal Behavior</td>
<td>4</td>
</tr>
<tr>
<td>ANS 123</td>
<td>Animal Growth &amp; Development</td>
<td>4</td>
</tr>
<tr>
<td>ANS 170</td>
<td>Ethics of Animal Use</td>
<td>4</td>
</tr>
<tr>
<td>ANT 151</td>
<td>Primate Evolution</td>
<td>4</td>
</tr>
<tr>
<td>ANT 152</td>
<td>Human Evolution</td>
<td>5</td>
</tr>
<tr>
<td>ANT 153</td>
<td>Human Genetics: Mutation &amp; Migration</td>
<td>5</td>
</tr>
<tr>
<td>ANT 154A</td>
<td>The Evolution of Primate Behavior</td>
<td>5</td>
</tr>
<tr>
<td>ANT 154B</td>
<td>Primate Evolutionary Ecology</td>
<td>5</td>
</tr>
<tr>
<td>ANT 155</td>
<td>Primate Conservation Biology</td>
<td>4</td>
</tr>
<tr>
<td>ANT 157</td>
<td>Advanced Human Genetics</td>
<td>2</td>
</tr>
<tr>
<td>ANT 157L</td>
<td>Advanced Human Genetics Lab</td>
<td>4</td>
</tr>
<tr>
<td>AVS 100</td>
<td>Avian Biology</td>
<td>3</td>
</tr>
<tr>
<td>AVS 103</td>
<td>Avian Development &amp; Genomics</td>
<td>3</td>
</tr>
<tr>
<td>AVS 115</td>
<td>Raptor Biology</td>
<td>3</td>
</tr>
<tr>
<td>BIM 140</td>
<td>Protein Engineering</td>
<td>4</td>
</tr>
<tr>
<td>BIM 143</td>
<td>Biomolecular Systems Engineering: Synthetic Biology</td>
<td>4</td>
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</table>

**Biological Sciences (BIS)—all upper division courses.** (https://catalog.ucdavis.edu/courses-subject-code/bis/)

**Exercise Biology (EXB)—all upper division courses.** (https://catalog.ucdavis.edu/courses-subject-code/exb/)

**Molecular & Cellular Biology (MCB)—all upper division courses.** (https://catalog.ucdavis.edu/courses-subject-code/mcb/)

**Microbiology (MIC)—all upper division courses.** (https://catalog.ucdavis.edu/courses-subject-code/mic/)

**Microbiology & Molecular Genetics (MMG)—all upper division courses.** (https://catalog.ucdavis.edu/courses-subject-code/mmg/)

**Entomology (ENT)—all upper division courses.** (https://catalog.ucdavis.edu/courses-subject-code/ent/)

**Environmental Data Science**
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
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<tbody>
<tr>
<td>PLP 130</td>
<td>Fungal Biology &amp; Disease</td>
<td>3</td>
</tr>
<tr>
<td>PLS 100A</td>
<td>Metabolic Processes of Cultivated Plants</td>
<td>3</td>
</tr>
<tr>
<td>PLS 100B</td>
<td>Growth &amp; Yield of Cultivated Plants</td>
<td>3</td>
</tr>
<tr>
<td>PLS 101</td>
<td>Agriculture &amp; the Environment</td>
<td>3</td>
</tr>
<tr>
<td>PLS/ESM 144</td>
<td>Trees &amp; Forests</td>
<td>4</td>
</tr>
<tr>
<td>PLS 147</td>
<td>California Plant Communities</td>
<td>3</td>
</tr>
<tr>
<td>PLS 150</td>
<td>Sustainability &amp; Agroecosystem Management</td>
<td>4</td>
</tr>
<tr>
<td>PLS 152</td>
<td>Plant Genetics</td>
<td>4</td>
</tr>
<tr>
<td>PLS 154</td>
<td>Introduction to Plant Breeding</td>
<td>4</td>
</tr>
<tr>
<td>PLS 162</td>
<td>Urban Ecology</td>
<td>3</td>
</tr>
<tr>
<td>PLS 172</td>
<td>Biology and Quality of Harvested Crops</td>
<td>4</td>
</tr>
<tr>
<td>PMI 126</td>
<td>Fundamentals of Immunology</td>
<td>3</td>
</tr>
<tr>
<td>PMI 127</td>
<td>Medical Bacteria &amp; Fungi</td>
<td>3</td>
</tr>
<tr>
<td>PMI 128</td>
<td>Biology of Animal Viruses</td>
<td>3</td>
</tr>
<tr>
<td>SAS/HIS 109</td>
<td>Environmental Change, Disease &amp; Public Health</td>
<td>4</td>
</tr>
<tr>
<td>SAS 110</td>
<td>Applications of Evolution in Medicine, Human Behavior, &amp; Agriculture</td>
<td>4</td>
</tr>
<tr>
<td>SOC 163</td>
<td>Population Health: Social Determinants &amp; Disparities in Health</td>
<td>4</td>
</tr>
<tr>
<td>SSC 111</td>
<td>Soil Microbiology</td>
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<tr>
<td>STA 101</td>
<td>Advanced Applied Statistics for the Biological Sciences</td>
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<tr>
<td>STS/ANT 129</td>
<td>Health &amp; Medicine in a Global Context</td>
<td>4</td>
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<tr>
<td>STS/ENL 164</td>
<td>Writing Science</td>
<td>4</td>
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<tr>
<td>UWP 111C</td>
<td>Specialized Topics in Journalism: Science Journalism</td>
<td>4</td>
</tr>
<tr>
<td>UWP 120</td>
<td>Rhetorical Approaches to Scientific &amp; Technological Issues</td>
<td>4</td>
</tr>
<tr>
<td>UWP 121</td>
<td>History of Scientific Writing</td>
<td>4</td>
</tr>
<tr>
<td>VEN 110</td>
<td>Grapevine Growth &amp; Physiology</td>
<td>3</td>
</tr>
<tr>
<td>VME 158</td>
<td>Infectious Disease in Ecology &amp; Conservation</td>
<td>3</td>
</tr>
</tbody>
</table>

1 Courses numbered 198 do not fulfill restricted elective units without advisor approval. Discussion section courses, those noted with a "D" do not fulfill restricted elective units. Only 3 units of approved seminar or research courses can be applied to the restrictive electives.