## Molecular Environmental Biology Major Requirements

### Lower Division Requirements: (note: all courses must be taken for a letter grade)

- **ESPM Environmental Science Core: 1 course from ESPM 2, 5, 10, 15, or 46**
- **ESPM Social Science Core: 1 course from ESPM C11 (L&S C30U), C12 (ENG C77), 50AC or 60**
- One course (3-4 units) in Arts & Literature, Historical Studies, or Philosophy & Values
- One course (3-4 units) in Social & Behavioral Sciences or International Studies

Select courses from "7 Breadth" listing: [http://ls-advice.berkeley.edu/requirements/lstreq.html#7breadth](http://ls-advice.berkeley.edu/requirements/lstreq.html#7breadth)

- Two courses in Reading & Composition (8 units): R1A & R1B

### Upper Division Requirements:

#### 15 upper division units must be taken in the College of Natural Resources (EEP, ES, ESPM, NST, PMB)

**Biological Core:** Select two courses from area A and two courses from area B. No more than one course from each category. Complete area C and area D and 12 units in Area of Concentration. With the exception of the lab courses, each course can be used to satisfy only one requirement. Courses cannot overlap with the Area of Concentration requirement.

#### AREA A

<table>
<thead>
<tr>
<th>Biochemistry</th>
<th>MCB 102: Biochemistry and Molecular Biology (4)</th>
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<tr>
<td>MCB 110: General Biochemistry and Molecular Biology (4)</td>
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**Molecular Biology/Genetics**

- **ESPM 108B:** Environmental Change Genetics (3)  
- **PMB 108:** Plant Molecular Genetics (3)  
- **IB 141:** Human Genetics (3)  
- **IB 161:** Population and Evolutionary Genetics (4)  

**Cell & Developmental Biology**

- **MCB 130:** Cell Biology (4)  
- **MCB 130 A:** Cell and Systems Biology (4)  
- **MCB 133 L:** Physiology and Cell Biology Lab (4)  
- **MCB 141:** Developmental Biology (3)  

**Organismal Physiology**

- **ESPM 144:** Insect Physiology (3)  
- **IB 132:** Survey of Human Physiology (3)  
- **IB 140:** Human Reproduction (4)  
- **IB 148:** Comparative Animal Physiology (3)  
- **IB 150:** Evolutionary Environmental Physiology (3)  

**Organismal Diversity**

- **ESPM 106:** American Wildlife (3), lab included  
- **ESPM 108A:** Trees: Taxonomy, Growth & Struct. (3), lab included  
- **ESPM 115B:** Biology of Aquatic Insects (2)  
- **ESPM 132:** Spider Biology (4), lab included  
- **ESPM C138/PMB C114/MCB C114:** Intro Comparative Virology (4)  
- **ESPM 140:** General Entomology (4), lab included  
- **IB 102 & L:** Introduction to California Plant Life (2,2)  
- **IB 103 & L:** Invertebrate Zoology (3,2)  

**Ecology**

- **ESPM 102A:** Resource Ecology (4), lab included  
- **ESPM 110:** Primate Ecology (4)  
- **ESPM 111:** Ecosystem Ecology (3)  
- **ESPM 112:** Microbial Ecology (3)  
- **ESPM 113:** Insect Ecology (3)  
- **ESPM 114:** Wildlife Ecology (3)  
- **ESPM 115C:** Fish Ecology (3), lab included  
- **ESPM 116A:** A or C: Forest, Range, or Tropical Ecology (3 or 4)  

**Senior Seminar:**

- **ESPM 192:** Molecular Approaches to Environmental Problem Solving (2)  

### AREA B

**Ecology**

- **ESPM 119:** Chemical Ecology (2)  
- **ESPM 131:** Soil Microbial Ecology (3)  
- **ESPM 137:** Landscape Ecology (3), lab included  
- **ESPM C149/IB C149:** Molecular Ecology (4)  
- **IB 153:** Population and Community Ecology (3)  
- **IB 154 & L:** Plant Population and Community Ecology (2, 2)  
- **IB 157LF:** Ecosystems of California (4)  
- **IB 159:** The Living Planet: Biosphere and Earth Systems (3)  
- **IB 181:** Paleobotany: History of a Greening Planet (4)  

### Lab Requirement:

Two upper division courses – either in the Biological Core or Area of Concentration – must include a lab. 3-4 independent study lab units (H196, 199) may be used to fulfill one lab requirement.

*See reverse side for Areas of Concentration*
Molecular Environmental Biology Major Requirements

Area of Concentration Requirement: Select 12 units from one concentration. Up to four independent study units (e.g., ESPM 199, ESPM H196) may be applied to the concentration.

ANIMAL HEALTH & BEHAVIOR
- ANTHRO C135: Paleoenvironnment: Archaeological Methods & Laboratory Techniques (4) (lab incl.)
- ESPM C126/IB 144: Animal Behavior (4)
- ESPM C135/IB 114: Intro to Comparative Virology (4)
- ESPM C148/NST C114: Pesticide Chemistry & Toxicology (3)

ANIMAL HEALTH & ENVIRONMENT
- ESPM 152: Global Change Biology (3)
- ESPM 155: Biodiversity Conservation in Working Landscapes (4)
- ESPM C159/NST C115: Human Diet (4)
- ESPM 162: Bioethics (4)
- ESPM 167: Environmental Health & Development (4)
- IB N116: Medical Parasitology (4) (lab incl.)
- IB N117: Medical Ethenobotany Laboratory (2)
- IB 131: General Human Anatomy (3)
- IB 131L: General Human Anatomy Lab (2)
- IB 137: General Endocrinology (4)
- IB 140: Biology & Sociobiology of Human Reproduction (4)
- IB C143A/Psych C113: Biological Clocks: Physiology & Behavior (3)
- IB C143B: General Entomology (lab incl.)
- IB 184: Evolution of Hominid Behavior (4)
- Psych 121: Animal Cognition (3)

GLOBAL CHANGE BIOLOGY
- CIV ENG 107: Climate Change Mitigation (3)
- ECON C102: Natural Resource Economics (2)
- ENRES 101: Ecoloy & Society – Energy & Resources (3)
- ENRES 102: Quantitative Aspects of Global Environmental Problems (4)
- ENV SCI 125: Environments of the San Francisco Bay Area (3)
- ENVECON C175: The Economics of Climate Change (4)
- EPS 102: History & Evolution of Planet Earth (4)
- EPS 115: Stratigraphy & Earth History (4)
- ESPM 152: Global Change Biology (3)
- ESPM C170: Carbon Cycle Dynamics (3)
- GEOG 142: Climate Dynamics (4)
- GEOG 143: Global Change Biogeochemistry (3)
- GEOG C139: Atmospheric Physics & Dynamics (3)
- IB 154: Plant Ecology, (3,2)
- IB 159: The Living Planet: Biosphere and Earth Systems (3)
- LD ARCH 110L: Ecological Analysis Laboratory (3)
- LD ARCH C188: Geographic Information Systems (4)
- PMB 122: Bioenergy (2)
- PMB 180: Environmental Plant Biology (2)
- PB HLTH C160: Environmental Health & Development (4)
- UGIS 162E: Environmental Policymaking & the Politics of Climate Change (4)
- UGIS 176B: Green Governance (4)
- ANTHRO C129D: Holocene Paleocology: How Humans Changed the Earth (3)

ECOLOGY
- ESPM 105A: Sierra Nevada Ecology (4) (Summer Forestry Camp)
- ESPM C103/IB C156: Principles of Conservation Biology (4)
- ESPM 110: Primate Ecology (4)
- ESPM C104/EPP C115: Modeling & Management of Bio. Resources (4)
- ESPM 111: Ecosystem Ecology (3)
- ESPM 112: Microbial Ecology (3)
- ESPM 113: Insect Ecology (3)
- ESPM 114: Wildlife Ecology (3)
- ESPM 115C: Fish Ecology (lab included)
- ESPM 116B: Range Ecology (3)
- ESPM 116G: Tropical Forest Ecology (3)
- ESPM 117: Urban Garden Ecosystems (4) (lab included)
- ESPM 118: Agricultural Ecology (3)
- ESPM 119: Chemical Ecology (2)
- ESPM C130/Geog C136: Water in Terrestrial Environment (3)
- ESPM 131: Soil Microbiology (3)
- ESPM 134: Fire, Insects, & Diseases in Forest Ecosystems (3)
- ESPM 137: Landscape Ecology (3) (lab included)
- ESPM 147: Field Entomology: "Ants," "Beetles," & "Spiders" (1 unit each)
- SP: All three courses = one lab course.
- ESPM C149/IB C149: Molecular Ecology (4)
- ESPM 152: Global Change Biology (3)
- ESPM 158: Biodiversity Conservation in Working Landscapes (4)
- ESPM 172: Photogrammetry & Remote Sensing (3)
- ESPM 173: Introduction to Ecological Data Analysis (3)
- ESPM 174: Design & Analysis of Ecological Research (3)
- ESPM 181: Wildland Fire Science (3)
- ESPM 188: Case Histories in Wildfire Management (2)
- PMB 180: Environmental Plant Biology (2)
- IB 102FL: Introduction to California Plant Life (4)
- IB 151: Physiological Ecology of Plants (3)
- IB 153: Population & Community Ecology (3)
- IB 154L: Plant Ecology (3,2)
- IB C155/Anthro C129D: Holocene Paleocology (3)
- IB 171: Plant Physiological Ecology (4)

INSECT BIOLOGY/ARTHROPOD SCIENCE
- ESPM 135: Insect Ecology (2)
- ESPM 132: Spider Biology (4) (lab incl.)
- ESPM 134: Fire, Insects, & Diseases in Forest Ecosystems (3)
- ESPM 140: General Entomology (4) (lab incl.)
- ESPM 142: Insect Behavior (3)
- ESPM 144: Insect Physiology (3)
- ESPM 147: Field Entomology: "Ants," "Beetles," & "Spiders" (1 each) Taking all three courses = one lab course.
- ESPM 148: Pesticide Chemistry & Toxicology (3)
- ESPM 172: Photogrammetry & Remote Sensing (3)

BIODIVERSITY
- ESPM C103/IB C156: Principles of Conservation Biology (4)
- ESPM 105: Natural History Museums & Biodiversity Science (3) (lab incl.)
- ESPM 109: Keep it Natural, America's Animal Habitats (3)
- ESPM 109A: Trees: Taxonomy, Growth & Structures (3) (lab included)
- ESPM 132: Spider Biology (4) (lab incl.)
- ESPM 140: General Entomology (4) (lab incl.)
- ESPM 147: Field Entomology: "Ants," "Beetles," & "Spiders" (1 each)
- SP: All three courses must be completed to equal one "lab course".
- IB 100B: Principles of Biodiversity (3)
- IB 102FL: Introduction to California Plant Life (4)
- IB 103FL: Invertebrate Zoology (5)
- IB 104FL: Natural History of the Vertebrates (5)
- IB 160: Evolution (4)
- IB 166: Evolutionary Biogeography (4)
- IB 168FL: Systematics of Vascular Plants (4)
- IB 173FL: Mammalogy (5)
- IB 174FL: Ornithology (4)
- IB 175FL: Herpetology (4)
- IB 183: Evolution of the Vertebrates (3)
- IB 183L: Laboratory in Vertebrate Evolution (1)
- PMB 110 & L: Biology of Fungi (3,2)
- PMB 113: California Mushrooms (3) (lab included)
- PMB C116/MCB C116: Microbial Diversity (3)
- PMB 120 & L: Biology of Algae (2,2)

For the Moreau Program (13-unit ESPM C107/IB 115/Geog C142: Biology & Geomorphology of Tropical Islands), a maximum of 4 units can be applied to an area of concentration. This course can also satisfy for one laboratory course. Students can petition for having some units fulfill additional requirements.