### Molecular Environmental Biology Major Requirements (2020-2021)

**Lower Division Requirements:** (note: all courses must be taken for a letter grade)
- ESPM Environmental Science Core: 1 course from ESPM 2, 6, C10 (L&S C30V), 15, or C46
- ESPM Social Science Core: 1 course from ESPM 5, C11 (L&S C30U), C12 (ENG C77), C22AC, 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" categories: [https://ls.berkeley.edu/seven-course-breadth-requirement](https://ls.berkeley.edu/seven-course-breadth-requirement)
- Two courses in Reading & Composition (8 units): R1A & R1B

<table>
<thead>
<tr>
<th>Math: 2 semesters</th>
<th>Chemistry: 3 semesters</th>
<th>Biology: 2 semesters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math 16A/1A/10A:</td>
<td>(3-4)</td>
<td>□ Chem 1A/L: General Chemistry (5)</td>
</tr>
<tr>
<td>Calculus I</td>
<td>□ Chem 3A/L: Organic Chemistry I (5)</td>
<td></td>
</tr>
<tr>
<td>And choose one of the following (calc OR stats):</td>
<td>□ Chem 3B/L: Organic Chemistry II (5)</td>
<td></td>
</tr>
<tr>
<td>Math 16B/1B/10B:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calculus II</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Statistics: 2, C8, 20, PH 141, 142 (or W142), or Stat 131A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Statistics is required for many pre-health and environmental research programs.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physics: 1 semester</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physics 8A: Introductory Physics (4)</td>
<td>□ Bio 1A/L: General Biology (5)</td>
<td></td>
</tr>
<tr>
<td>*note: Physics 8B is required for many pre-health programs</td>
<td>□ Bio 1B: General Biology (4)</td>
<td></td>
</tr>
</tbody>
</table>

**Upper Division Requirements:** (note: all courses must be taken for a letter grade)
- 15 upper division units must be taken in Rausser College (EEP, ESPM, NST, PMB, ERG)

**Biological Core:** Select two courses from area A and two courses from area B. Complete 12 units in Area of Concentration. Complete lab requirement (see below).
*With the exception of the lab courses, each course can be used to satisfy only one requirement. Core courses cannot overlap with the Area of Concentration requirement.*

### Area A: Genetics, Molecular, Cell, and Developmental Biology

| CHEM 135: Chemical Biology (3) | MCB 135L: Physiology and Cell Biology Lab (4) lab included |
| ESPM 108B: Environmental Change Genetics (3) lab included | MCB 137L: Physical Biology of the Cell (4) lab included |
| IB 141: Human Genetics (3) | MCB 140: General Genetics (4) |
| IB 161: Population and Evolutionary Genetics (4) | MCB 141: Developmental Biology (4) |
| IB 162: Ecological Genetics (4) | PH 162A: Public Health Microbiology (3), PH 162L (2) |
| MCB 100A/CHEM C130: Biophysical Chemistry (4) | MCB C112/MCB C112: General Microbiology (4), |
| MCB 102: Biochemistry and Molecular Biology (4) | PMB C112L/MCB C112L (2) |
| MCB 104: Genetics, Genomics, and Cell Biology (4) | PMB 135: Physiology and Biochemistry of Plants (3) |
| MCB 130: Cell and Systems Biology (4) | PMB 160: Plant Molecular Genetics (3) |

### Area B: Ecology, Evolution, and Organismal Biology

| ESPM 108A: Trees: Taxonomy, Growth & Struct. (3) lab included | IB 148: Comparative Animal Physiology (3) |
| ESPM 111: Ecosystem Ecology (4) | IB 150: Evolutionary Environmental Physiology (3) |
| ESPM 112: Microbial Ecology (3) ESPM 112L (1) | IB 151: Plant Physiological Ecology (4), IB 151L (2) |
| ESPM 113: Insect Ecology (3) | IB 153: Ecology (3) |
| ESPM 114: Wildlife Ecology (3) | IB 154: Plant Ecology (3), IB 154L (2) |
| ESPM C115C/IB C176L: Fish Ecology (3) lab included | IB 157LF: Ecosystems of California (4) |
| ESPM 116B: Range Ecology (4) lab included | IB 160: Evolution (4) |
| ESPM C125/GEOG C148/IB C166: Biogeography (4) | IB 167: Evolution & Earth History: Genes to Fossils (4) |
| ESPM 131: Soil Microbial Ecology (3) | IB 168L: Systematics of Vascular Plants (4) lab included |
| ESPM 132: Spider Biology (4) lab included | IB 181L: Paleobotany: Hist. of a Greening Planet (4) lab included |
| ESPM 137: Landscape Ecology (3) lab included | IB 184L: Morphology of the Vertebrate Skeleton with Lab (4) |
| ESPM C136/PMB C114/MCB C114: Intro Comparative Virology (4) | IB C185L/ANTH C100: Human Paleontology (5) lab included |
| ESPM 140: General Entomology (4) lab included | MCB 136: Physiology (4) |
| ESPM 142: Insect Behavior (3) | NST 103: Nutrient Function and Metabolism (3) |
| ESPM 144: Insect Physiology (3) | PMB C110L/IB C110L: Biology of Fungi (4) lab included |
| IB 102LF: Introduction to California Plant Life (4) lab included | PMB 113: California Mushrooms (3) lab included |
| IB 103LF: Invertebrate Zoology (5) lab included | PMB C116/MCB C116: Microbial Diversity (3) |
| IB 104LF: Natural History of the Vertebrates (5) lab included | PMB 120: Biology of Algae (2) PMB 120L (2) |

**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, UGIS 192C) may be used to fulfill one lab requirement.

The Moorea Program (13-unit ESPM C107/IB 158FL: Biology & Geomorphology of Tropical Islands), will count as 4 units towards any area of concentration, one Area B requirement, and one lab course. *Many study abroad programs will count in these areas—for specific program info, talk to the major advisor.*

---

**See reverse side for Areas of Concentration**

If you have questions about the MEB major, please contact meb.ugrad@berkeley.edu

*revised March 2020*
### Molecular Environmental Biology Major Requirements

**Area of Concentration Requirement:** Select 12 units from one concentration. Up to four research units (e.g., 199, H196, UG15) may be applied to the concentration.

#### ANIMAL HEALTH & BEHAVIOR

- **ESPM C103/IB C156**: Principles of Conservation Biology (4)
- **ESPM 106**: American Wildlife (3)
- **ESPM 114**: Wildlife/MCB C114: Intro to Comparative Virology (4)
- **ESPM C126/IB C144**: Animal Behavior (4)
- **ESPM 142**: Insect Behavior (3)
- **ESPM C156/IB C145**: Animal Communication (3)
- **ESPM 157**: Data Science in Global Change Biology (4) lab included
- **ESPM 158**: Biodiversity Conservation in Working Landscapes (4) lab included
- **ESPM 186**: Management & Conservation of Rangeland Ecosystems (4)
- **ESPM C192**: Molecular Approaches to Env. Problem Solving (2)
- **IB 104LF**: Natural History of the Vertebrates (5) lab included
- **IB 135: Mechanics of Organisms (4)**
- **IB 135L/BIO ENG C136/EL ENG C1450**: Mechanics of Organisms Lab (3)
- **IB C143A/PSYCH C113**: Biological Clocks: Physiology & Behavior (3)
- **IB 143B/PSYCH C114**: Hormones & Behavior (3)
- **IB 146LF**: Behavioral Ecology (5) lab included
- **IB 148**: Comparative Animal Physiology (3)
- **IB 173FL: Mammalogy (5) lab included**
- **IB 174FL: Ornithology with Laboratory (4)**
- **IB 175FL: Herpetology with Laboratory (4)**
- **IB 184L: Morphology of the Vertebrate Skeleton with Laboratory (4)**
- **PSYCH 121**: Animal Cognition (3)

#### GLOBAL CHANGE BIOLOGY

- **CIV ENG 107**: Climate Change Mitigation (3)
- **ENVECON C120/CON C102**: Natural Resource Economics (4)
- **ENE RES 101**: Ecology & Society (3)
- **ENE RES 102**: Quantitative Aspects of Global Environmental Problems (4)
- **ENVECON C175/IAS C175**: The Economics of Climate Change (4)
- **EPS 102**: History & Evolution of Planet Earth (4)
- **EPS 115**: Stratigraphy & Earth History (4)
- **EPS C181/GEOS C139**: Atmospheric Physics & Dynamics (3)
- **ESPM 108B**: Environmental Geochronology (3) lab included
- **ESPM 137**: Landscape Ecology (3) lab included
- **ESPM 152**: Global Change Biology (3)
- **ESPM 157**: Data Science in Global Change Biology (4) lab included
- **ESPM 162/PCE C130**: Terrestrial Hydrology (4)
- **ESPM C170/EPS C183**: Carbon Cycle Dynamics (3)
- **ESPM C192**: Molecular Approaches to Env. Problem Solving (2)
- **GEOG 140A**: Physical Landscapes: Process and Form (4)
- **GEOG 142**: Climate Dynamics (4)
- **GEOG 143**: Global Change Biogeochemistry (3)
- **GEOG 149B**: Climate Impacts and Risk Analysis (3)
- **GEOS C188/LD ARCH C188**: Geographic Information Systems (4)
- **IB 154**: Plant Ecology (IB 154L) (2)
- **IB 159**: The Living Planet: Biosphere Impact on Earth Systems (3)
- **LD ARCH 112L**: Ecological Analysis Laboratory (2)
- **PMB 122**: Bioenergy (4)
- **PMB 180**: Environmental Plant Biology (2)

#### ECeology

- **ESPM C103/IB C156**: Principles of Conservation Biology (4)
- **ESPM C104/ENVECON C115**: Modeling & Management of Bio. Resources (4)
- **ESPM 105A**: Sierra Nevada Ecology (4) (Summer Forestry Camp)
- **ESPM 111**: Ecosystem Ecology (4)
- **ESPM 112**: Microbial Ecology (3)
- **ESPM 116L**: Microbial Metagenomic Data Analysis Lab (1)
- **ESPM 113**: Insect Ecology (3)
- **ESPM 114**: Wildlife Ecology (3)
- **ESPM C115A/IB C171**: Freshwater Ecology (3)
- **ESPM 115B/IB C176**: Fish Ecology (3) lab included
- **ESPM 116B**: Range Ecology (4) lab included
- **ESPM 117**: Urban Garden Ecosystems (4) lab included
- **ESPM 118**: Agricultural Ecology (4)
- **ESPM C130/GEOS C136**: Terrestrial Hydrology (4)
- **ESPM 131**: Soil Microbiology (3)
- **ESPM 133**: Soil Ecology (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)
  
#### ENVIRONMENT & HUMAN HEALTH

- **ANTHRO 135**: Paleoenobotany (4) lab included
- **ESPM C126/IB C144**: Animal Behavior (4)
- **ESPM C128/PMB C146**: Intro to Comparative Virology (4)
- **ESPM C148/NST C114**: Pesticide Chemistry & Toxicology (3)
- **ESPM 152**: Global Change Biology (3)
- **ESPM 157**: Data Science in Global Change Ecology (4) lab included
- **ESPM 158**: Biodiversity Conservation in Working Landscapes (4) lab included
- **ESPM C159/NST C119**: Human Diet (4)
- **ESPM 162**: Bioethics and Society (4)
- **ESPM 162A**: Health, Medicine, Society and Environment (4)
- **ESPM C157/PMB C146**: Health, Medicine, Society and Environment (4)
- **ESPM 166**: Medical Parasitology (4) lab included
- **IB 117**: Medical Ethnobotany (2)
- **IB 117FL**: Medical Ethnobotany Laboratory (2)
- **IB 120**: Quantitative Methods in Biology (4)
- **IB 131**: General Human Anatomy (3)
- **IB 131L**: General Human Anatomy Lab (2)
- **IB 137**: Human Endocrinology (4)
- **IB 140**: Biology of Human Reproduction (4)
- **IB C143A/PSYCH C113**: Biological Clocks: Physiology & Behavior (3)
- **IB C143B/PSYCH C116**: Hormones & Behavior (3)
- **IBC 133A**: Molecular Endocrinology (3)
- **MCB 150**: Molecular Immunology (4)
- **MCB 160**: Neurobiology (4)
- **MCB 165**: Neurobiological Disease (3)
- **NST 103**: Nutrient Function & Metabolism (3)
- **NST 108A**: Intro & Application of Food Science (3)
- **NST 110**: Toxicology (4)
- **NST 160**: Metabolism of Human Health & Diseases (4)
- **NST 166**: Nutrition in the Community (3)
- **PMB C103/MCB C103/PH C102**: Bacterial Pathogenesis (3)
- **PH 101**: A Sustainable World: Challenges and Opportunities (3)
- **PH 116**: Sem. Social, Political, & Ethical Issues in Health & Medicine (3) P/NP okay
- **PH 150B**: Introduction to Environmental Health Sciences (3)
- **PH 196**: Artificial Intelligence in Medicine and Health Policy (3)
- **PSYCH 110**: Introduction to Biological Psychology (3)

#### INSECT BIOLOGY/ARTHROPOD SCIENCE

- **Note:** ESPM 140: General Entomology is required for this concentration
- **ESPM C105/IB C105**: Nat. Hist. Museums & Biodiv. (3) lab included
- **ESPM 113**: Insect Ecology (3)
- **ESPM 132**: Spider Biology (4) lab included
- **ESPM 136**: Fire, Insect & Disease in Forest Ecosystems (3)
- **ESPM 140**: General Entomology (4) lab included
- **ESPM 141**: Insect Behavior (3)
- **ESPM 144**: Insect Physiology (3)
- **ESPM 147**: Field Entomology: “Ants,” “Beetles,” & “Spiders” (1 unit each)
  
#### BIODIVERSITY

- **ESPM C103/IB C156**: Principles of Conservation Biology (4)
- **ESPM C105/COS C105**: Nat. Hist. Museums & Biodiv. (3) lab included
- **ESPM 106**: American Wildlife (3)
- **ESPM 108A**: Trees: Taxonomy, Growth & Structures (3) lab included
- **ESPM C125/GEOS C148/IB C166**: Biogeography (4)
- **ESPM C126/IB C144**: Animal Behavior (4)
- **ESPM 132**: Spider Biology (4) lab included
- **ESPM 140**: General Entomology (4) lab included
- **ESPM 142**: Insect Behavior (3)
- **ESPM 147**: Field Entomology: “Ants,” “Beetles,” & “Spiders” (1 unit each)
  
#### P/MB

- **PMB 110**: California Mushrooms (3) lab included
- **PMB C116/MCB C116**: Microbial Diversity (3)
- **PMB 120**: Biology of Algae (2) PMB 120L (2)

If you have questions about the MEB major, please contact meb.ugrad@berkeley.edu

revised March 2020