Microbial Biology Major Snapshot
Department of Plant & Microbial Biology

Microbial biology is a pivotal field of study because small life forms such as microbes, viruses, and fungi make up the majority of planetary biomass, and constitute key branches of the Tree of Life. Microbes play fundamental roles in maintaining biosphere health: they degrade environmental pollutants; they supply essential nutrients and chemicals directly to multi-cellular organisms, and they engage in numerous beneficial symbioses with higher organisms. Infectious diseases regulate populations of plant and animals, and outbreaks recur in human societies globally.

The major investigates interactions between microorganisms and the environment to determine the role microbes play in maintaining the health of our biosphere. This includes how microbes can help combat environmental pollutants, facilitate energy production, and influence the progress of medical research on infectious diseases.

Advising for the major is available in the CNR Office of Instruction & Student Affairs in 260 Mulford Hall. Students may drop in or schedule an appointment during advising hours: M, Tu, Th, F 9am-12pm and M-F 1-4pm. Visit the MB major website for more detailed information: https://nature.berkeley.edu/advising/majors/microbial-biology

Research Opportunities ♦ College Honors Program

In addition to the Berkeley's Undergraduate Research Apprenticeship Program (URAP), CNR students can also apply for faculty research projects through the CNR Sponsored Projects for Undergraduate Research (SPUR). Visit http://nature.berkeley.edu/undergraduate-research/spur for details.

Students with a GPA of 3.6 or higher may enroll in the College of Natural Resources Honors Program (H196) once they have reached upper division standing. To fulfill the program requirements, students design, conduct, and report on an individual research project working with a faculty sponsor. For more information, visit http://nature.berkeley.edu/advising/honors-program.

Getting a Degree

To earn a Bachelor of Science from U.C. Berkeley in Microbial Biology, students must fulfill unit and GPA requirements, university and campus requirements, college requirements, and major requirements. Please see the major advisor for more details about the major requirements.

College and University Unit Requirements ♦ GPA Requirements

- □ 120 Total Units
- □ 36 Upper Division Units
- □ 15 Upper Division Units must be completed in the College of Natural Resources (EEP, ERG, ES, ESPM, NST, PMB)

Students must maintain a 2.0 cumulative GPA, a 2.0 GPA in their MB upper Division major requirements, and not receive a grade below C- in their major requirements (lower and upper division courses).

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Microbial Biology Major Requirements

Lower Division Requirements (all major requirements must be taken for a letter grade)

Math & Statistics	Chemistry
□ *Math 10A: Methods of Mathematics: Calculus, Statistics, and Combinatorics [4] □ *Math 10B: Methods of Mathematics: Calculus, Statistics, and Combinatorics [4]	□ Chem 1A/L: General Chemistry [4] □ Chem 3A/L: Organic Chemistry I [5] □ Chem 3B/L: Organic Chemistry II [5]
Physics	**Biology**
□ Physics 8A: Introductory Physics [4]	□ Bio 1A/L: General Biology [5] □ Bio 1B: General Biology [4] □ *PMB 22 recommended (not required)*
Humanities & Social Sciences	**University Requirements**
□ 15 units of coursework taken from L&S breadth list, excluding biological and physical science courses *maximum of 6 foreign language units*	□ Entry Level Writing □ R1A □ R1B □ American Cultures □ American History □ American Institutions

Upper Division Core Requirements

□ MCB C100A, 100B, 102, or 110: Biochemistry [4]	□ PMB C148: Microbial Genomics & Genetics [4] □ PMB C112/L: General Microbiology [4/2]

Upper Division Core Electives: Choose 2 courses

- PMB C103: Bacterial Pathogenesis [3] **or***
  IB 118: Host-Pathogen Interactions [4] **or***
  PH 162A: Public Health Microbiology [3]
- PMB 110/L: Biology of Fungi [4]
- PMB 113: California Mushrooms [3]
- PMB C114: Comparative Virology [4]
- PMB C116: Microbial Diversity [3]
- PMB 120/L: Biology of Algae [4]
- PMB 165: Plant Microbe Interactions [3]
- ESPM 112: Microbial Ecology [3] **or***
  ESPM 131: Soil Microbial Ecology [3]

Microbial Biology Concentrations: Choose from Option 1 or 2

Option 1: Choose a concentration from below and select four courses. One of the four courses may be selected from the Upper Division Core Electives listed above. This course **may not** be counted for **both** the Upper Division Core Electives and your concentration.

Option 2 (General Microbiology Concentration): Choose any four courses from the Microbial Biology Concentrations (below) and/or the Upper Division Core Electives (above). Courses selected in Option 2 **may not** overlap with the two courses used for the Upper Division Core Electives.

Host-Pathogen Interactions

- PMB 135: Physiology & Biochemistry of Plants [3]
  MCB 150: Molecular Immunology [4]
- PMB 150: Plant Cell Biology [3]
  MCB 104: Genetics, Genomics & Cell Biology [4]
- PMB 160: Plant Molecular Genetics [3] **or***
  MCB 140: General Genetics [4]
- PMB 185: Techniques in Light Microscopy [3]
- BioE 100: Ethics in Science & Engineering [3] **or***
  ESPM 162: Bioethics & Society [4]
- IB 115: Intro to Systems in Biology & Medicine [4]
- IB 119: Evaluating Scientific Evidence in Medicine [3]
- PH 150A: Intro to Epidemiology & Human Disease [4]
- PH 150B: Intro to Environmental Health Sciences [3]
- PMB H196/199: Research [3-4]

Evolution/Computational Genomics

- BioE 144: Intro to Protein Informatics [4]
  BioE 144L: Protein Informatics Lab [2]
- BioE 131: Intro to Computational Molecular & Cell Biology [4]
  CS 61A: The Structure & Interpretation of Computer Programs [4] *
  CS 61B: Data Structures [4]
- BioE 135: Frontiers in Microbial Systems Biology [4]
- BioE 143: Computational Methods in Biology [4] **or***
  Math 127: Mathematical & Computational Methods in Molecular Biology [4]
- IB 160: Evolution [4] **or***
  IB 161: Population & Evolutionary Genetics [4]
- IB 166: Evolutionary Biogeography [4]
- MCB 140: General Genetics [4]
- MCB 143: Evolution of Genomes, Cells & Development [3]
- PMB H196/199: Research [3-4]

Ecology & Environmental Microbiology

- BioE 100: Ethics in Science & Engineering [3] **or***
  ESPM 162: Bioethics & Society [4]
- BioE 135: Frontiers in Microbial Systems Biology [4]
- ESPM 134: Insects, Fire & Diseases in Forest Ecosystems [3]
- PMB C192: Molecular Approaches to Environmental Problem Solving [2]
- IB 153: Ecology [3]
- IB 161: Population & Evolutionary Genetics [4]
- IB 162: Ecological Genetics [4]
- IB 166: Evolutionary Biogeography [4]
- MCB 137: Computer Simulation in Biology [3]
- PMB H196/199: Research [3-4]

Microbial Biotechnology

- PMB 122: Bioenergy [2]
- PMB C124: Lectures on Energy: Energy from Biomass [3]
- PMB 150: Plant Cell Biology [3]
  MCB 104: Genetics, Genomics & Cell Biology [4]
- PMB 170: Modern Applications of Plant Biotechnology [2]
- BioE 100: Ethics in Science & Engineering [3] **or***
  ESPM 162: Bioethics & Society [4]
- PMB C192: Molecular Approaches to Environmental Problem Solving [2]
- MCB 137: Computer Simulation in Biology [3]
- MCB 140*: General Genetics [4]
- PMB H196/199: Research [3-4]

*No more than one course may be taken from this group to satisfy requirement

*Students seeking exception to the Math 10A and Math 10B requirement must contact the MB major undergraduate advisor

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