

# Plant & Microbial Biology

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## Overview

The Department of Plant and Microbial Biology consists of the Division of Plant Biology and the Division of Microbial Biology. Programs at both the undergraduate and graduate levels have been designed to offer students maximum flexibility in defining their own areas of interest. In addition to departmental resources that are available in Koshland Hall, the facilities of the College of Natural Resources Biological Imaging Facility and the United States Department of Agriculture Plant Gene Expression Center are available for the programs of the department.

## The Division of Plant Biology

The Division of Plant Biology program emphasizes basic research and its application to plants and promotes the design of plant biotechnologies. With an increasing awareness of environmental problems, global changes, and emerging food needs, plants are a focal point for new research initiatives and educational training programs. Understanding the biology of plants, their development, their responses to the environment, and the impact of human activities on the plant biosphere are many of the challenges that will continue to fuel the expansion of plant biology research well into the twenty-first century.

## The Division of Microbial Biology

The Division of Microbial Biology was established within the department to provide a focus for microbial biology at UC Berkeley. There is a growing awareness that microbes and microbial activities are essential to maintaining a high quality of life for all eukaryotes. Moreover, understanding the microbial world is necessary if we are to comprehend the global ecosystem, evolutionary history, and diversity of life on earth. The twenty-first century will bring a new understanding of the workings of the global ecosystem and a wealth of new technologies derived from the microbial world. The new microbial biology research programs are designed to meet this challenge.

## Undergraduate Programs

Genetics and Plant Biology (<https://guide.berkeley.edu/undergraduate/degree-programs/genetics-plant-biology/>): BS  
 Microbial Biology (<https://guide.berkeley.edu/undergraduate/degree-programs/microbial-biology/>): BS

## Graduate Programs

The department and affiliated graduate group offer the following graduate degrees:

Microbiology (<https://guide.berkeley.edu/graduate/degree-programs/microbiology/>): PhD  
 Plant Biology (<https://guide.berkeley.edu/graduate/degree-programs/plant-biology/>): PhD

## Plant and Microbial Biology

### PLANTBI 200A Plant Developmental Genetics 1.5 Unit

Terms offered: Fall 2024, Fall 2023, Fall 2022

The students will be provided with both the basic framework and current topics of plant developmental genetics.

#### Rules & Requirements

**Prerequisites:** Consent of instructor

#### Hours & Format

**Fall and/or spring:** 5 weeks - 4 hours of lecture and 2 hours of discussion per week

#### Additional Details

**Subject/Course Level:** Plant and Microbial Biology/Graduate

**Grading:** Letter grade.

**Instructor:** Hake

### PLANTBI 200B Genomics and Computational Biology 1.5 Unit

Terms offered: Fall 2024, Fall 2023, Fall 2022

Principles of computational and genomic biology. Covers evolutionary, algorithmic, and statistical foundations of sequence analysis, allowing students to understand concepts underlying modern computational methods. Practical applications will be pursued in student-coordinated sessions. Combined lecture with 220B.

#### Rules & Requirements

**Prerequisites:** Consent of instructor

#### Hours & Format

**Fall and/or spring:** 5 weeks - 4 hours of lecture and 2 hours of discussion per week

#### Additional Details

**Subject/Course Level:** Plant and Microbial Biology/Graduate

**Grading:** Letter grade.

**Instructor:** Freeling

## **PLANTBI 200C Plant Diversity and Evolution 1.5 Unit**

Terms offered: Fall 2024, Fall 2023, Fall 2022

This course will introduce the students to the diversity of plant form and function and provide them with a basic understanding of the tools and techniques used to study plant diversification and evolution. Molecular and morphological data will be discussed and plant diversity will be introduced at molecular, population, organismal, and ecological levels.

### **Rules & Requirements**

**Prerequisites:** Consent of instructor

### **Hours & Format**

**Fall and/or spring:** 5 weeks - 4 hours of lecture and 2 hours of discussion per week

### **Additional Details**

**Subject/Course Level:** Plant and Microbial Biology/Graduate

**Grading:** Letter grade.

**Instructor:** Blackman

## **PLANTBI 200D Plant Cell Biology 1.5 Unit**

Terms offered: Spring 2025, Spring 2024, Spring 2023

The course will describe the conceptual framework of plant cell biology followed by in-depth discussion of several active areas of research including cell wall biology, membrane transport, cellular trafficking, and cell signaling.

### **Rules & Requirements**

**Prerequisites:** Consent of instructor

### **Hours & Format**

**Fall and/or spring:** 5 weeks - 4 hours of lecture and 2 hours of discussion per week

### **Additional Details**

**Subject/Course Level:** Plant and Microbial Biology/Graduate

**Grading:** Letter grade.

**Instructor:** Luan

## **PLANTBI 200E Plant Biochemistry 1.5 Unit**

Terms offered: Spring 2025, Spring 2024, Fall 2021

The aim of this course is to augment the student's knowledge of key plant-specific (or particularly relevant) biochemical processes focusing on the underlying experiments used to deduce key cycles coupled with current areas of exploration and debate surrounding a given topic area. In addition, this section will broaden and deepen the student's knowledge of biochemistry in general including basic enzyme kinetics, assessment of enzymatic (biochemical) function, and modes of regulation.

### **Rules & Requirements**

**Prerequisites:** Consent of instructor

### **Hours & Format**

**Fall and/or spring:** 5 weeks - 4 hours of lecture and 2 hours of discussion per week

### **Additional Details**

**Subject/Course Level:** Plant and Microbial Biology/Graduate

**Grading:** Letter grade.

**Instructor:** Scheller

## **PLANTBI 200F Plant-Environment Interactions 1.5 Unit**

Terms offered: Spring 2025, Spring 2024, Spring 2023

Students will be provided with both the historical framework and current topics in the molecular mechanisms underlying plant dynamic responses to external signals and stresses.

### **Rules & Requirements**

**Prerequisites:** Consent of instructor

### **Hours & Format**

**Fall and/or spring:** 5 weeks - 4 hours of lecture and 2 hours of discussion per week

### **Additional Details**

**Subject/Course Level:** Plant and Microbial Biology/Graduate

**Grading:** Letter grade.

**Instructor:** Harmon

## PLANTBI 201 Faculty Research Review 2 Units

Terms offered: Fall 2024, Fall 2023, Fall 2022

Presentation and discussion of faculty research in the areas of plant and microbial biology. Faculty speakers review recent advances in their area of expertise and present an outlook of current research activities in their laboratories. The format of the class is designed to stimulate a dialogue between instructor and students in the course of each presentation.

### Rules & Requirements

**Prerequisites:** Consent of instructor

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

### Additional Details

**Subject/Course Level:** Plant and Microbial Biology/Graduate

**Grading:** Offered for satisfactory/unsatisfactory grade only.

## PLANTBI 202 Faculty Research Review 2 Units

Terms offered: Fall 2024, Fall 2023, Fall 2022

Presentation and discussion of faculty research in the area of microbial biology. Faculty speakers review recent advances in their area of expertise and present an outlook of current research activities in their laboratories. The format of the class is designed to stimulate a dialogue between instructor and students in the course of each presentation.

### Rules & Requirements

**Prerequisites:** Consent of instructor

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

### Additional Details

**Subject/Course Level:** Plant and Microbial Biology/Graduate

**Grading:** Offered for satisfactory/unsatisfactory grade only.

## PLANTBI 205A Introduction to Research 2 - 12 Units

Terms offered: Fall 2024, Fall 2023, Fall 2022

Closely supervised experimental work under the direction of an individual faculty member; an introduction to experimental methods and research approaches in particular areas of plant and microbial biology.

### Rules & Requirements

**Prerequisites:** Consent of instructor

### Hours & Format

**Fall and/or spring:** 15 weeks - 2-12 hours of independent study per week

### Additional Details

**Subject/Course Level:** Plant and Microbial Biology/Graduate

**Grading:** Letter grade. This is part one of a year long series course. A provisional grade of IP (in progress) will be applied and later replaced with the final grade after completing part two of the series.

## PLANTBI 205B Introduction to Research 2 - 12 Units

Terms offered: Spring 2025, Spring 2024, Spring 2023

Closely supervised experimental work under the direction of an individual faculty member; an introduction to experimental methods and research approaches in particular areas of plant and microbial biology.

### Rules & Requirements

**Prerequisites:** Consent of instructor

### Hours & Format

**Fall and/or spring:** 15 weeks - 2-12 hours of independent study per week

### Additional Details

**Subject/Course Level:** Plant and Microbial Biology/Graduate

**Grading:** Letter grade. This is part two of a year long series course. Upon completion, the final grade will be applied to both parts of the series.

## PLANTBI 210 Scientific Reasoning and Logic 1 Unit

Terms offered: Spring 2025, Spring 2024, Spring 2023

The objectives of this class are to teach students to critically read and interpret scientific papers. Students will read and discuss strongly and poorly reasoned papers. At the end of the class the student should understand the logic and reasoning which make a paper strong, often classic, contribution.

### Hours & Format

**Fall and/or spring:** 15 weeks - 1 hour of lecture per week

### Additional Details

**Subject/Course Level:** Plant and Microbial Biology/Graduate

**Grading:** Letter grade.

**Instructor:** Quail

## PLANTBI C216 Microbial Diversity Workshop 1 Unit

Terms offered: Fall 2024, Fall 2022, Fall 2021

This workshop for graduate students will parallel C116, Microbial Diversity, which should be taken concurrently. Emphasis in the workshop will be on review of research literature and formulation of paper pertinent to research in microbial diversity.

### Rules & Requirements

**Prerequisites:** Graduate standing; C112 or consent of instructor and organic chemistry (may be taken concurrently)

### Hours & Format

**Fall and/or spring:** 15 weeks - 1 hour of workshop and 1 hour of discussion per week

### Additional Details

**Subject/Course Level:** Plant and Microbial Biology/Graduate

**Grading:** Letter grade.

**Instructor:** Coates

**Formerly known as:** Molecular and Cell Biology C216, Plant and Microbial Biology C216

**Also listed as:** MCELLBI C216

## PLANTBI 220A Microbial Genetics 1.5 Unit

Terms offered: Fall 2024, Fall 2023, Fall 2022

The students will learn fundamental principles and advanced techniques in microbial genetics. The use of genetics in deducing biochemical pathways, protein interactions, and signal transduction pathways will be explored through reading and discussion of current and classic papers from the primary literature. Experimental design and interpretation will be the focus of problem sets solved in student-coordinated sessions.

### Rules & Requirements

**Prerequisites:** Consent of instructor

### Hours & Format

**Fall and/or spring:** 5 weeks - 4 hours of lecture and 2 hours of discussion per week

### Additional Details

**Subject/Course Level:** Plant and Microbial Biology/Graduate

**Grading:** Letter grade.

**Instructor:** Taga

## PLANTBI 220B Genomics and Computational Biology 1.5 Unit

Terms offered: Fall 2024, Fall 2023, Fall 2022

Principles of computational and genomic biology. Covers evolutionary, algorithmic, and statistical foundations of sequence analysis, allowing students to understand concepts underlying modern computational methods. Practical applications will be pursued in student-coordinated sessions. Combined lecture with 200B.

### Rules & Requirements

**Prerequisites:** Consent of instructor

### Hours & Format

**Fall and/or spring:** 5 weeks - 4 hours of lecture and 2 hours of discussion per week

### Additional Details

**Subject/Course Level:** Plant and Microbial Biology/Graduate

**Grading:** Letter grade.

**Instructor:** Grigoriev

## PLANTBI 220C Microbial Diversity and Evolution 1.5 Unit

Terms offered: Spring 2025, Fall 2024, Fall 2023

The students will be provided with both the basic framework and current topics of microbial diversity and evolution.

### Rules & Requirements

**Prerequisites:** Consent of instructor

### Hours & Format

**Fall and/or spring:** 5 weeks - 4 hours of lecture and 2 hours of discussion per week

### Additional Details

**Subject/Course Level:** Plant and Microbial Biology/Graduate

**Grading:** Letter grade.

**Instructor:** Brem

## PLANTBI 220D Cell Structure and Function 1.5 Unit

Terms offered: Spring 2025, Fall 2024, Spring 2024

The students will be provided with both the basic framework and current topics of cell structure and function.

### Rules & Requirements

**Prerequisites:** Consent of instructor

### Hours & Format

**Fall and/or spring:** 5 weeks - 4 hours of lecture and 2 hours of discussion per week

### Additional Details

**Subject/Course Level:** Plant and Microbial Biology/Graduate

**Grading:** Letter grade.

**Instructor:** Komeili

## PLANTBI 220E Microbial Physiology 1.5 Unit

Terms offered: Spring 2025, Spring 2024, Spring 2023

The students will be provided with both the basic framework and current topics of microbial physiology.

### Rules & Requirements

**Prerequisites:** Consent of instructor

### Hours & Format

**Fall and/or spring:** 5 weeks - 4 hours of lecture and 2 hours of discussion per week

### Additional Details

**Subject/Course Level:** Plant and Microbial Biology/Graduate

**Grading:** Letter grade.

**Instructor:** Coates

## PLANTBI 220F Microbial Ecology 1.5 Unit

Terms offered: Spring 2025, Spring 2024, Spring 2023

The students will be provided with both the basic framework and current topics of microbial ecology.

### Rules & Requirements

**Prerequisites:** Consent of instructor

### Hours & Format

**Fall and/or spring:** 5 weeks - 4 hours of lecture and 2 hours of discussion per week

### Additional Details

**Subject/Course Level:** Plant and Microbial Biology/Graduate

**Grading:** Letter grade.

**Instructor:** Lindow

## PLANTBI 222 Biochemistry of Biofuels: Concepts and Foundations 1 Unit

Terms offered: Spring 2015, Spring 2014, Spring 2013

This course offers a consideration of genes, enzymes, metabolic pathways and biochemical processes leading to the generation of hydrogen, bio-oils, ethanol, and other biofuels. Discussion of biochemistry is extended to cover product yields and techno-economic analyses of commercial viability of the various biofuel products. Lectures are based on historical and contemporary papers in plant and microbial biochemistry, integrating structure, function and evolution of the molecular, cellular, and organismal levels, and discussing how this knowledge can be applied in the generation of renewable biofuels.

### Rules & Requirements

**Prerequisites:** Consent of instructor

### Hours & Format

**Fall and/or spring:** 15 weeks - 1 hour of lecture per week

### Additional Details

**Subject/Course Level:** Plant and Microbial Biology/Graduate

**Grading:** Letter grade.

**Instructor:** Melis

## PLANTBI C224 The Berkeley Lectures on Energy: Energy from Biomass 3 Units

Terms offered: Fall 2015, Fall 2014, Fall 2013

After an introduction to the different aspects of our global energy consumption, the course will focus on the role of biomass. The course will illustrate how the global scale of energy guides the biomass research. Emphasis will be placed on the integration of the biological aspects (crop selection, harvesting, storage, and distribution, and chemical composition of biomass) with the chemical aspects to convert biomass to energy. The course aims to engage students in state-of-art research.

### Rules & Requirements

**Prerequisites:** Biology 1A; Chemistry 1B or 4B, Mathematics 1B

**Repeat rules:** Course may be repeated for credit under special circumstances: Repeatable when topic changes with consent of instructor.

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

### Additional Details

**Subject/Course Level:** Plant and Microbial Biology/Graduate

**Grading:** Letter grade.

**Instructors:** Bell, Blanch, Clark, Smit, C. Somerville

**Also listed as:** BIO ENG C281/CHEM C238/CHM ENG C295A

## PLANTBI 238 Readings in Environmental Microbiology 1 Unit

Terms offered: Fall 2014, Spring 2014, Fall 2013

Special Topics and Advanced Seminars in Plant Pathology. Seminar/discussion by graduate students of current research in the field of plant pathogenic bacteria.

### Rules & Requirements

**Prerequisites:** Consent of instructor

**Repeat rules:** Course may be repeated for credit without restriction.

### Hours & Format

**Fall and/or spring:** 15 weeks - 1 hour of discussion per week

### Additional Details

**Subject/Course Level:** Plant and Microbial Biology/Graduate

**Grading:** Offered for satisfactory/unsatisfactory grade only.

**Instructor:** Lindow

**Formerly known as:** Environmental Science, Policy, and Management 238A

## PLANTBI C277 Communicating Quantitative Information 2 Units

Terms offered: Fall 2021, Spring 2020, Spring 2019

This course will cover several aspects of communicating quantitative information, with a primary focus on visualizations for publications, presentations, and posters. Other topics include sharing of data and analyses, such as new publication models and interactive notebooks, as well as lifecycle data management and publication. Primary discussion will be on conceptual issues, and students will be expected to use various systems and resources as self-directed homestudy.

### Hours & Format

**Fall and/or spring:** 15 weeks - 1.5 hours of seminar and 1.5 hours of discussion per week

### Additional Details

**Subject/Course Level:** Plant and Microbial Biology/Graduate

**Grading:** Letter grade.

**Instructor:** Brenner

**Also listed as:** MCELLBI C277

## PLANTBI 290 Seminar 1 - 2 Units

Terms offered: Spring 2025, Fall 2024, Spring 2024

Advanced study in various fields of plant biology and microbial biology. Topics will be announced in advance of each semester. Enrollment in more than one section permitted.

### Rules & Requirements

**Prerequisites:** Consent of instructor

**Repeat rules:** Course may be repeated for credit without restriction.

### Hours & Format

#### Fall and/or spring:

8 weeks - 2-4 hours of seminar per week

15 weeks - 1-2 hours of seminar per week

### Additional Details

**Subject/Course Level:** Plant and Microbial Biology/Graduate

**Grading:** Letter grade.

## PLANTBI 292 Research Review in Plant and Microbial Biology 1 Unit

Terms offered: Spring 2025, Fall 2024, Spring 2024

Lectures, reports, and discussions on current research in plant and microbial biology. Sections are operated independently and directed toward different topics.

### Rules & Requirements

**Prerequisites:** Open to properly qualified graduate students with consent of instructor

**Repeat rules:** Course may be repeated for credit without restriction.

### Hours & Format

**Fall and/or spring:** 15 weeks - 2 hours of seminar per week

### Additional Details

**Subject/Course Level:** Plant and Microbial Biology/Graduate

**Grading:** Offered for satisfactory/unsatisfactory grade only.

## PLANTBI 296 Graduate Supervised Independent Study 1 - 12 Units

Terms offered: Spring 2025, Fall 2024, Spring 2024

Graduate student independent study under the supervision of a faculty member. Sections are operated independently and directed toward different topics.

### Rules & Requirements

**Prerequisites:** Graduate standing

**Repeat rules:** Course may be repeated for credit without restriction.

### Hours & Format

**Fall and/or spring:** 15 weeks - 1-12 hours of independent study per week

### Summer:

6 weeks - 2.5-30 hours of independent study per week

8 weeks - 1.5-22.5 hours of independent study per week

### Additional Details

**Subject/Course Level:** Plant and Microbial Biology/Graduate

**Grading:** Letter grade.

## PLANTBI 297 Grant Writing and Research Presentations 2 Units

Terms offered: Spring 2024, Spring 2023, Spring 2022

Each student will write a grant proposal in three steps: a one page outline, a three-page pre-proposal, and a complete 10-page grant proposal. There will be feedback at each step in the process -- each participant will review the other grant proposals. Some of the scheduled classes will include discussion of the outlines and pre-proposals, and the last class will be organized as a grant panel, with students assigned as primary and secondary reviewers.

### Hours & Format

**Fall and/or spring:** 15 weeks - 2 hours of lecture per week

### Additional Details

**Subject/Course Level:** Plant and Microbial Biology/Graduate

**Grading:** Letter grade.

**Instructor:** McCormick

## PLANTBI 298 Plant Biology Group Studies 1 - 6 Units

Terms offered: Spring 2025, Fall 2024, Spring 2024

Advanced study of research topics which will vary semester to semester. Enrollment in more than one section permitted.

### Rules & Requirements

**Prerequisites:** Consent of instructor

**Repeat rules:** Course may be repeated for credit without restriction.

### Hours & Format

**Fall and/or spring:** 15 weeks - 1-6 hours of colloquium per week

### Additional Details

**Subject/Course Level:** Plant and Microbial Biology/Graduate

**Grading:** The grading option will be decided by the instructor when the class is offered.

## PLANTBI 299 Graduate Research 1 - 12 Units

Terms offered: Spring 2025, Fall 2024, Spring 2024

Graduate student research.

### Rules & Requirements

**Prerequisites:** Graduate standing

**Repeat rules:** Course may be repeated for credit without restriction.

### Hours & Format

**Fall and/or spring:** 15 weeks - 0 hours of independent study per week

### Summer:

6 weeks - 1-12 hours of independent study per week

8 weeks - 1-12 hours of independent study per week

### Additional Details

**Subject/Course Level:** Plant and Microbial Biology/Graduate

**Grading:** Letter grade.

## **PLANTBI 375 Workshop on Teaching 2 Units**

Terms offered: Fall 2020, Fall 2019, Fall 2018

Designed for all graduate students. This course has two goals: discussion of questions and problems relating to the GSI's teaching, and learning how to design and execute a whole course. Effective teaching methods will be introduced by experienced GSIs and faculty. Students will participate in reciprocal classroom visits, visitation and critique of faculty lectures, course design, lecture preparation, sample lecture presentation, and discussion of current literature on teaching.

### **Rules & Requirements**

**Prerequisites:** Graduate student status

**Repeat rules:** Course may be repeated for credit up to a total of 4 units.

### **Hours & Format**

**Fall and/or spring:** 15 weeks - 2 hours of lecture per week

### **Additional Details**

**Subject/Course Level:** Plant and Microbial Biology/Professional course for teachers or prospective teachers

**Grading:** Offered for satisfactory/unsatisfactory grade only.

**Instructors:** Fischer, Kerfeld

## **PLANTBI 602 Individual Study for Graduate Students 1 - 2 Units**

Terms offered: Spring 2025, Fall 2024, Spring 2024

Individual study in consultation with the major field advisor, intended to provide an opportunity for qualified students to prepare for examinations required of Ph.D. candidates

### **Rules & Requirements**

**Prerequisites:** Graduate standing and instructor consent

**Credit Restrictions:** Course does not satisfy unit or residence requirements for doctoral degree.

**Repeat rules:** Course may be repeated for credit with instructor consent.

### **Hours & Format**

**Fall and/or spring:** 15 weeks - 1-2 hours of independent study per week

### **Summer:**

6 weeks - 1-2 hours of independent study per week

8 weeks - 1-2 hours of independent study per week

### **Additional Details**

**Subject/Course Level:** Plant and Microbial Biology/Graduate examination preparation

**Grading:** Offered for satisfactory/unsatisfactory grade only.