Genetics and Plant Biology

Bachelor of Science (BS)

The Department of Plant and Microbial Biology's (PMB) undergraduate major program in Genetics and Plant Biology has been developed as a broadly based program emphasizing the study of plants from the molecular and genetic to organismal levels. Lower division courses are intended to produce a foundation in biological and physical sciences as preparation for advanced study at the upper division level. Coursework from the Department of Plant and Microbial Biology, which can be used as a foundation for medical school application, is interesting and varied. The small department provides a rich and supportive environment for learning.

Plant Biology emphasizes the study of plants from the genetics to the organism. From oxygen to food to shelter to energy to shade, plants provide humans with virtually everything needed to survive and thrive. There is important work for those who want to unravel the mystery of genes, teach the next generation of biologists or to devise ways to feed the world.

Admission to the Major

Freshman students may apply directly to the major, or they may select the College of Natural Resource's undeclared option, and declare the major by the end of their fourth semester. For further information regarding how to declare the major after admission, including information on a change of major of change of college, please see the College of Natural Resources Undergraduate Student Handbook (http://www.cnr.berkeley.edu/site/forms/oisa/undergrad_handbook.pdf) .

Minor Program

There is no minor program in Genetics and Plant Biology.

Other Major Offered by the Department of Plant and Microbial Biology

Microbial Biology (http://guide.berkeley.edu/archive/2014-15/undergraduate/degree-programs/microbial-biology)

In addition to the University, campus, and college requirements, listed on the College Requirements tab, students must fulfill the below requirements specific to their major program.

General Guidelines

1. All courses taken to fulfill the major requirements below must be taken for graded credit, other than courses listed which are offered on a *Pass/No Pass* basis only. Other exceptions to this requirement are noted as applicable.
2. A minimum cumulative grade point average (GPA) of 2.0 is required.
3. A minimum GPA of 2.0 in upper-division major requirements is required.
4. At least 15 of the 36 required upper-division units must be taken in the College of Natural Resources (except for students majoring in Environmental Economics and Policy; please see the EEP major adviser for further information).
5. A maximum of 16 units of Independent Study (courses numbered 97, 98, 99, 197, 198, and 199) may count toward graduation, with a maximum of 4 units of Independent Study per semester.
6. No more than 1/3 of the total units attempted at UC Berkeley may be taken Pass/Not Pass. This includes units in the Education Abroad Program and UC Intercampus Visitor or Exchange Programs.
7. A maximum of 4 units of Physical Education courses will count toward graduation.

For information regarding residence requirements and unit requirements, please see the College Requirements tab.

Students in this major choose a concentration in Biological, Physical, or Social Sciences.

Lower-division Requirements

MATH 16A	Analytic Geometry and Calculus	3-4
or MATH 1A	Calculus	
MATH 16B	Analytic Geometry and Calculus	3-4
or MATH 1B	Calculus	
CHEM 1A & 1AL	General Chemistry and General Chemistry Laboratory	4
CHEM 3A & 3AL	Chemical Structure and Reactivity and Organic Chemistry Laboratory	5
CHEM 3B & 3BL	Chemical Structure and Reactivity and Organic Chemistry Laboratory	5
STAT 2	Introduction to Statistics [1]	4
or STAT 20	Introduction to Probability and Statistics	
or STAT 131A	Introduction to Probability and Statistics for Life Scientists	
BIOLOGY 1A & 1AL	General Biology Lecture and General Biology Laboratory	5
BIOLOGY 1B	General Biology Lecture and Laboratory	4
PHYSICS 8A	Introductory Physics	4
Recommended, not required: PLANTBI 20		

[1] Other Statistics courses may be approved by the department.

Upper-division Requirements

Core Requirements		
PLANTBI 101L	Experimental Plant Biology Laboratory	3
PLANTBI C107L	Principles of Plant Morphology with Laboratory	3
PLANTBI 135	Physiology and Biochemistry of Plants	3
PLANTBI 150	Plant Cell Biology	3
PLANTBI 160	Plant Molecular Genetics	3
Plant Biology Tracks		
Select 5 courses, for a minimum of 15 units:		
Option 1: Choose five courses from one of the tracks below		

Option 2, Experimental Plant Biology: Design your own track, by choosing any five courses from the tracks below

Plant Biology Tracks

Biotechnology and Bioenergy

PLANTBI C103	Bacterial Pathogenesis	3
PLANTBI C112	General Microbiology	4
PLANTBI 120 & 120L	Biology of Algae and Laboratory for Biology of Algae	4
PLANTBI 122	Bioenergy	2
PLANTBI C124	The Berkeley Lectures on Energy: Energy from Biomass	3
PLANTBI 142	Plant Genomics and Bioinformatics (must be taken concurrently with C144L)	2
PLANTBI C148	Microbial Genomics and Genetics	4
PLANTBI 170	Modern Applications of Plant Biotechnology	2
PLANTBI 180	Environmental Plant Biology	2
PLANTBI 185	Techniques in Light Microscopy	3
ENE,RES C100	Energy and Society	4
ESPM 108A	Trees: Taxonomy, Growth, and Structures	3
ESPM 108B	Environmental Change Genetics	3
ESPM 152	Global Change Biology	3
ESPM 162	Bioethics and Society	4
INTEGBI 117 & 117L	Medical Ethnobotany and Course Not Available	4
INTEGBI 151	Plant Physiological Ecology	4
INTEGBI 162	Ecological Genetics	4
MCELLBI 102	Survey of the Principles of Biochemistry and Molecular Biology	4
PLANTBI H196	Honors Research - Plant and Microbial Biology	3-4
or PLANTBI 199	Supervised Independent Study and Research	

Plant Diversity and Evolution

PLANTBI C102L	Course Not Available	4
PLANTBI 110 & 110L	Course Not Available and Course Not Available	4
PLANTBI 113	California Mushrooms	3
PLANTBI 120 & 120L	Biology of Algae and Laboratory for Biology of Algae	4
PLANTBI 142	Plant Genomics and Bioinformatics (must be taken concurrently with C144L)	2
PLANTBI 180	Environmental Plant Biology	2
PLANTBI 185	Techniques in Light Microscopy	3
ESPM 108A	Trees: Taxonomy, Growth, and Structures	3
ESPM 108B	Environmental Change Genetics	3
ESPM 149	Course Not Available	2
ESPM 152	Global Change Biology	3
INTEGBI 102LF	Introduction to California Plant Life with Laboratory	4
INTEGBI 117 & 117L	Medical Ethnobotany and Course Not Available	4
INTEGBI 151	Plant Physiological Ecology	3
INTEGBI 154	Plant Ecology	3
INTEGBI 157LF	Ecosystems of California	4
INTEGBI 160	Evolution	4
INTEGBI 161	Population and Evolutionary Genetics	4
INTEGBI 162	Ecological Genetics	4
INTEGBI 163	Molecular and Genomic Evolution	3
INTEGBI 168L	Systematics of Vascular Plants with Laboratory	4
INTEGBI 181	Course Not Available	3
PLANTBI H196	Honors Research - Plant and Microbial Biology	3-4
or PLANTBI 199	Supervised Independent Study and Research	

Plant Genetics, Genomics and Bioinformatics

PLANTBI C134	Chromosome Biology/Cytogenetics	3
PLANTBI 142 & PLANTBI C144	Plant Genomics and Bioinformatics and Protein Informatics Laboratory	4
PLANTBI C144	Introduction to Protein Informatics	4
PLANTBI C148	Microbial Genomics and Genetics	4
PLANTBI 165	Plant-Microbe Interactions	3
PLANTBI 170	Modern Applications of Plant Biotechnology	2
PLANTBI 185	Techniques in Light Microscopy	3
BIO ENG 131	Introduction to Computational Molecular and Cell Biology	4
BIO ENG 143	Computational Methods in Biology	4
INTEGBI 162	Ecological Genetics	4
INTEGBI 163	Molecular and Genomic Evolution	3
MATH 127	Mathematical and Computational Methods in Molecular Biology	4
STAT C143	Course Not Available	4
MCELLBI 102	Survey of the Principles of Biochemistry and Molecular Biology	4
MCELLBI 130A	Cell and Systems Biology	4
ESPM 108B	Environmental Change Genetics	3
PLANTBI H196	Honors Research - Plant and Microbial Biology	3-4
or PLANTBI 199	Supervised Independent Study and Research	

Plant Microbe Interactions

PLANTBI C102L	Course Not Available	4
PLANTBI C103	Bacterial Pathogenesis	3
PLANTBI 110 & PLATNBI 110L	Course Not Available and Course Not Available	4
PLANTBI C112	General Microbiology	4
PLANTBI C112L	General Microbiology Laboratory	2
PLANTBI 113	California Mushrooms	3
PLANTBI C114	Introduction to Comparative Virology	4
PLANTBI C116	Microbial Diversity	3
PLANTBI 120 & 120L	Biology of Algae and Laboratory for Biology of Algae	4
PLANTBI 142	Plant Genomics and Bioinformatics (must be taken concurrently with C144L)	2
PLANTBI C148	Microbial Genomics and Genetics	4
PLANTBI 165	Plant-Microbe Interactions	3
PLANTBI 180	Environmental Plant Biology	2
PLANTBI 185	Techniques in Light Microscopy	3
MCELLBI 102	Survey of the Principles of Biochemistry and Molecular Biology	4

ESPM 131	Soil Microbial Ecology	3
PLANTBI H196	Honors Research - Plant and Microbial Biology	3-4
or PLANTBI 199	Supervised Independent Study and Research	

For College Requirements, please refer to the College of Natural Resources (http://guide.berkeley.edu/archive/2014-15/undergraduate/colleges-schools/natural-resources/#collegerequirementstext) .

Learning Goals for the Major

1. Training in the basic sciences (i.e. math, physics, chemistry, biology and statistics)
2. Training in the fundamental aspects of plant morphology, plant molecular genetics, plant cell biology, and the physiology and biochemistry of plants
3. Training in a wider variety of plant and microbial courses, which may be selected by the student to enhance their knowledge in areas of their specific interest
4. Training in the essential laboratory techniques associated with genetics and plant biology
5. Training students to read and evaluate primary literature in the field of plant biology
6. Training students to have a high level of competency in both oral and written presentation of scientific material
7. Training students to carry out research projects independently (this includes critical thinking and the development of a hypothesis to test, designing experiments to specifically test their hypothesis, and other aspects of the scientific method including data analysis and interpretation, as well as oral and written presentation of their research)
8. Training students to appreciate the relationship of their major to the community at large

Genetics and Plant Biology

PLANTBI 10 Plants, Agriculture, and Society 2 Units
Changing patterns of agriculture in relation to population growth, the biology and social impact of plant disease, genetic engineering of plants: a thousand years of crop improvement and modern biotechnology, interactions between plants and the environment, and effects of human industrial and agricultural activity on plant ecosystems. Knowledge of the physical sciences is neither required nor assumed.
Hours & Format

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

Additional Details

Subject/Course Level: Plant and Microbial Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Staskawicz, David Zilberman

PLANTBI 11 Fungi, History, and Society 3 Units
Fungi have interacted with humans in both positive and negative ways throughout history. These interactions have included production of foods, medicines, fuels, plant and animal diseases, decay, allergies, and mind-altering drugs.
Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Plant and Microbial Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Bruns, Taylor

PLANTBI 20 Introduction to the Plant Sciences at Berkeley 1 Unit
This course will include discussions on the academic path (courses) needed for the Genetics and Plant Biology major; an introduction to resources and facilities for studies of the plant sciences at Berkeley, such as the University Herbarium and the Botanical Garden; an exploration of plant science related careers, including presentations from guest speakers who work in organic farming, government, and Cooperative Extension; talks by faculty about their current research, and information about how to do research in a lab.
Hours & Format

Fall and/or spring: 15 weeks - 1 hour of lecture and 0 hours of discussion per week

Additional Details

Subject/Course Level: Plant and Microbial Biology/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Alternative to final exam.

Instructor: Feldman

PLANTBI 22 Microbes Make the World Go Around 2 Units
Although often unseen, microbes are everywhere! This course covers the role that microbes, including archaea, bacteria, protists and fungi, play in terrestrial, marine and extreme environments and their effect on the geochemistry of the earth. In addition, we will explore the profound effects of microbes on human and plant health and how microbes have changed the course of human history.
Hours & Format

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

Additional Details

Subject/Course Level: Plant and Microbial Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Glass

PLANTBI 24 Freshman Seminar 1 Unit
Reading and discussion with Plant and Microbial Biology faculty on current research and topics in plant and microbial biology. Topics which may be discussed include microbial biology, plant genetics, plant development, plant pathology, agricultural biotechnology, and genetic engineering. Ideal for students who are considering a major in the Department of Plant and Microbial Biology. Enrollment is limited to 20 freshmen.
Hours & Format

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

Additional Details

Subject/Course Level: Plant and Microbial Biology/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam required.

PLANTBI 39E Freshman/Sophomore Seminar 2 - 4 Units
Freshman and sophomore seminars offer lower division students the opportunity to explore an intellectual topic with a faculty member and a group of peers in a small-seminar setting. These seminars are offered in all campus departments; topics vary from department to department and from semester to semester. Enrollment limits are set by the faculty, but the suggested limit is 25.
Rules & Requirements

Repeat rules: Course may be repeated for credit when topic changes.

Hours & Format

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

Additional Details

Subject/Course Level: Plant and Microbial Biology/Undergraduate

Grading/Final exam status: The grading option will be decided by the instructor when the class is offered. Final exam required.

Instructor: Lindow

PLANTBI 40 The (Secret) Life of Plants 3 Units
Covers contemporary topics in plant biology. Examines how plants grow, reproduce, and respond to the environment (e.g., to light) in ways distinct from animals. Presents basic principles of genetics, cell, and molecular biology. Basics of genetic engineering and biotechnology reveal how they are used to modify plants, and these socially relevant issues are assessed. Includes visit to modern plant biology research laboratory, and aspects of plant disease and diversity. Knowledge of the physical sciences neither required nor assumed.
Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Plant and Microbial Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Zambryski

PLANTBI 84 Sophomore Seminar 1 or 2 Units
Sophomore seminars are small interactive courses offered by faculty members in departments all across the campus. Sophomore seminars offer opportunity for close, regular intellectual contact between faculty members and students in the crucial second year. The topics vary from department to department and semester to semester. Enrollment limited to 15 sophomores.
Rules & Requirements

Prerequisites: At discretion of instructor

Repeat rules: Course may be repeated for credit as topic varies. Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring:
5 weeks - 3-6 hours of seminar per week
10 weeks - 1.5-3 hours of seminar per week
15 weeks - 1-2 hours of seminar per week

Summer:
6 weeks - 2.5-5 hours of seminar per week
8 weeks - 1.5-3.5 hours of seminar and 2-4 hours of seminar per week

Additional Details

Subject/Course Level: Plant and Microbial Biology/Undergraduate

Grading/Final exam status: The grading option will be decided by the instructor when the class is offered. Final exam required.

PLANTBI C96 Studying the Biological Sciences 1 Unit
Freshmen will be introduced to the "culture" of the biological sciences, along with an in-depth orientation to the academic life and the culture of the university as they relate to majoring in biology. Students will learn concepts, skills, and information that they can use in their major course, and as future science professionals. Restricted to freshmen in the biology scholars program.
Rules & Requirements

Prerequisites: Consent of instructor

Hours & Format

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

Additional Details

Subject/Course Level: Plant and Microbial Biology/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam required.

Instructor: Matsui

Also listed as: INTEGBI C96/MCELLBI C96

PLANTBI 98 Directed Group Study 1 - 3 Units
Lectures and small group discussions focusing on topics of interest, varying from semester to semester.
Rules & Requirements

Repeat rules: Course may be repeated for credit. Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 1-3 hours of directed group study per week

Additional Details

Subject/Course Level: Plant and Microbial Biology/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

PLANTBI 99 Supervised Independent Study and Research 1 - 4 Units
Lower division independent study and research intended for the academically superior student. Enrollment only with prior approval of faculty advisor directing the research.
Rules & Requirements

Prerequisites: GPA of 3.4 or higher; lower division status

Repeat rules: Course may be repeated for credit. Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 1-3 hours of independent study per week

Summer:
6 weeks - 2.5-8 hours of independent study per week
8 weeks - 1.5-6 hours of independent study per week
10 weeks - 1.5-4.5 hours of independent study per week

Additional Details

Subject/Course Level: Plant and Microbial Biology/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

PLANTBI 101L Experimental Plant Biology Laboratory 3 Units
Students will perform state-of-the-art research to address an important question in modern plant biology. The experimental progression exposes students to a variety of modern molecular approaches and techniques. Experimental design, data acquisition, and analysis of the student's real experimental data is emphasized. Research results will be presented in written and oral formats similar to those used in research laboratories.
Rules & Requirements

Prerequisites: BIOLOGY 1A-1B; Plant and Microbial Biology 135, 150, and 160 (may be taken concurrently)

Hours & Format

Fall and/or spring: 15 weeks - 6 hours of laboratory and 1 hour of discussion per week

Additional Details

Subject/Course Level: Plant and Microbial Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Wildermuth

PLANTBI C103 Bacterial Pathogenesis 3 Units
This course for upper division and graduate students will explore the molecular and cellular basis of microbial pathogenesis. The course will focus on model microbial systems which illustrate mechanisms of pathogenesis. Most of the emphasis will be on bacterial pathogens of mammals, but there will be some discussion of viral and protozoan pathogens. There will be an emphasis on experimental approaches. The course will also include some aspects of bacterial genetics and physiology, immune response to infection, and the cell biology of host-parasite interactions.
Rules & Requirements

Prerequisites: 100, 102 or 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/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Portnoy

Also listed as: MCELLBI C103/PB HLTH C102

PLANTBI C107L Principles of Plant Morphology with Laboratory 4 Units
An analysis of the structural diversity of land plants plants with emphasis on the developmental mechanisms responsible for this variation in morphology and the significance of this diversity in relation to adaptation and evolution.
Rules & Requirements

Prerequisites: BIOLOGY 1A-1B

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of lecture, 1 hour of discussion, and 4 hours of laboratory per week

Additional Details

Subject/Course Level: Plant and Microbial Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Specht

Also listed as: INTEGBI C107L

PLANTBI C110L Biology of Fungi with Laboratory 4 Units
Selected aspects of fungi: their structure, reproduction, physiology, ecology, genetics and evolution; their role in plant disease, human welfare, and industry. Offered even fall semesters.
Rules & Requirements

Prerequisites: BIOLOGY 1B

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 6 hours of laboratory per week

Additional Details

Subject/Course Level: Plant and Microbial Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Bruns, Taylor

Also listed as: INTEGBI C110L

PLANTBI C112 General Microbiology 4 Units
This course will explore the molecular bases for physiological and biochemical diversity among members of the two major domains, Bacteria and Archaea. The ecological significance and evolutionary origins of this diversity will be discussed. Molecular, genetic, and structure-function analyses of microbial cell cycles, adaptive responses, metabolic capability, and macromolecular syntheses will be emphasized.
Rules & Requirements

Prerequisites: BIOLOGY 1A and 1B

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Summer: 10 weeks - 4.5 hours of lecture and 1.5 hours of discussion per week

Additional Details

Subject/Course Level: Plant and Microbial Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Ryan

Also listed as: MCELLBI C112

PLANTBI C112L General Microbiology Laboratory 2 Units
Experimental techniques of microbiology designed to accompany the lecture in C112 and C148. The primary emphasis in the laboratory will be on the cultivation and physiological and genetic characterization of bacteria. Laboratory exercises will include the observation, enrichment, and isolation of bacteria from selected environments.
Rules & Requirements

Prerequisites: C112 (may be taken concurrently)

Hours & Format

Fall and/or spring: 15 weeks - 4 hours of laboratory and 1 hour of discussion per week

Summer: 10 weeks - 6 hours of laboratory and 1.5 hours of discussion per week

Additional Details

Subject/Course Level: Plant and Microbial Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.

Instructors: Komeili, Taga

Also listed as: MCELLBI C112L

PLANTBI 113 California Mushrooms 3 Units
This is a hands-on class in identification of macro fungi. Emphasis will be on laboratory work with fresh and dried fungi. Short lectures at the beginning of labs focus on mushroom systematic, collection techniques, and identification. Three weekend field trips are required in addition to the weekly laboratory. Previous course experience with fungi is recommended, but not required. Grades are based on tests and a collection.
Rules & Requirements

Prerequisites: Consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of laboratory and 1 hour of discussion per week

Additional Details

Subject/Course Level: Plant and Microbial Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Bruns

PLANTBI C114 Introduction to Comparative Virology 4 Units
This course will provide a comparative overview of virus life cycles and strategies viruses use to infect and replicate in hosts. We will discuss virus structure and classification and the molecular basis of viral reproduction, evolution, assembly, and virus-host interactions. Common features used during virus replication and host cellular responses to infection will be covered. Topics also included are common and emerging virus diseases, their control, and factors affecting their spread.
Rules & Requirements

Prerequisites: Introductory chemistry (Chemistry 1A or 3A-3B or equivalent) and introductory biology (BIOLOGY 1A, 1AL, and 1B or equivalent) and general biochemistry (Molecular and Cell Biology C100A or equivalent--preferably completed but may be taken concurrently)

Hours & Format

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

Additional Details

Subject/Course Level: Plant and Microbial Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Glaunsinger, Jackson

Also listed as: ESPM C138/MCELLBI C114

PLANTBI C116 Microbial Diversity 3 Units
This course for upper-division and graduate students will broadly survey myriad types of microbial organisms, both procaryote and eucaryote, using a phylogenetic framework to organize the concept of "biodiversity." Emphasis will be on the evolutionary development of the many biochemical themes, how they mold our biosphere, and the organisms that affect the global biochemistry. Molecular mechanisms that occur in different lineages will be compared and contrasted to illustrate fundamental biological strategies. Graduate students additionally should enroll in C216, Microbial Diversity Workshop.
Rules & Requirements

Prerequisites: Upper-division standing. C112 or consent of instructor and organic chemistry (may be taken concurrently)

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Plant and Microbial Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Coates

Formerly known as: 116

Also listed as: MCELLBI C116

PLANTBI 120 Biology of Algae 2 Units
General biology of freshwater and marine algae, highlighting current research and integrating phylogeny, ecology, physiology, genetics, and molecular biology.
Rules & Requirements

Prerequisites: BIOLOGY 1A-1B; Integrative Biology 101 recommended. Must be taken concurrently with 120L

Hours & Format

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

Additional Details

Subject/Course Level: Plant and Microbial Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Niyogi

PLANTBI 120L Laboratory for Biology of Algae 2 Units
Laboratories include study of representative types, identification of specimens collected during several field trips, and experiments on development, physiology, and molecular genetics.
Rules & Requirements

Prerequisites: BIOLOGY 1A-1B; Integrative Biology 101 recommended. Must be taken concurrently with 120

Hours & Format

Fall and/or spring: 15 weeks - 4 hours of laboratory per week

Additional Details

Subject/Course Level: Plant and Microbial Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.

Instructor: Niyogi

PLANTBI 122 Bioenergy 2 Units
Offers an assessment of global energy supply and demand, addresses the chemistry of climate change, examines the response of plants and microbes to changes in the environment, and emphasizes the role of biology and photosynthesis in offering solutions to related energy and societal problems. Bioenergy is examined from the point-of-view of potential biofuels, including aspects of the biological generation of hydrogen, hydrocarbons, fatty acids, lipids, and bio-oils, polymers and related materials.
Rules & Requirements

Prerequisites: BIOLOGY 1A and 1B; Chemistry 3B

Hours & Format

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

Additional Details

Subject/Course Level: Plant and Microbial Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Melis, Pauly

PLANTBI C124 The Berkeley Lectures on Energy: Energy from Biomass 3 Units
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-the-art research.
Rules & Requirements

Prerequisites: Chemistry 1B or Chemistry 4B, Mathematics 1B, BIOLOGY 1A

Repeat rules: 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/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

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

Also listed as: BIO ENG C181/CHEM C138/CHM ENG C195A

PLANTBI C134 Chromosome Biology/Cytogenetics 3 Units
Survey of behavior, structure, and function of chromosomes with emphasis on behavior in model organisms. Topics include mitosis, meiosis, chromosome aberrations, genome function, dosage compensation, transposons, repetitive DNA, and modern cytological imaging.
Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Plant and Microbial Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Cande, Karpen

Also listed as: MCELLBI C134

PLANTBI 135 Physiology and Biochemistry of Plants 3 Units
A study of physiological and biochemical processes in higher plants, including water relations, ion transport, and hormone physiology; photosynthesis (light utilization and carbon assimilation), nitrogen and sulfur metabolism, and plant-specific biosynthetic pathways.
Rules & Requirements

Prerequisites: BIOLOGY 1A-1B

Hours & Format

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

Additional Details

Subject/Course Level: Plant and Microbial Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Melis, Terry

PLANTBI 142 Plant Genomics and Bioinformatics 2 Units
This course is designed as a companion course to Plant and Microbial Biology C144L and will equip students with the minimal skills required to use the main bioinformatics webservers and databases. Each lecture will present one or more webservers or databases and explain how to use that webserver as part of a protein function or structure prediction/ analysis.
Rules & Requirements

Prerequisites: Any lower division biology class. Genetics and Plant Biology majors in the Plant Genetics, Genomics, and Bioinformatics concentration must take this course concurrently with Plant and Microbial Biology C144L in order to receive credit toward the major

Hours & Format

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

Additional Details

Subject/Course Level: Plant and Microbial Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Sjolander

PLANTBI C144 Introduction to Protein Informatics 4 Units
This course will introduce students to the fundamentals of molecular biology, and to the bioinformatics tools and databases used for the prediction of protein function and structure. It is designed to impart both a theoretical understanding of popular computational methods, as well as some experience with protein sequence analysis methods applied to real data. This class includes no programming, and no programming background is required.
Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Plant and Microbial Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Sjolander

Also listed as: BIO ENG C144

PLANTBI C144L Protein Informatics Laboratory 3 Units
This course is intended to introduce students to a variety of bioinformatics techniques that are used to predict protein function and structure. It is designed to be taken concurrently with C144 (which provides the theoretical foundations for the methods used in the laboratory class), although students can petition to take this laboratory course separately. No programming is performed in this class, and no prior programming experience is required.
Rules & Requirements

Prerequisites: Bioengineering C144/Plant and Microbial Biology C144

Hours & Format

Fall and/or spring: 15 weeks - 9 hours of laboratory and 1 hour of lecture per week

Additional Details

Subject/Course Level: Plant and Microbial Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Sjolander

Also listed as: BIO ENG C144L

PLANTBI C148 Microbial Genomics and Genetics 4 Units
Course emphasizes bacterial and archaeal genetics and comparative genomics. Genetics and genomic methods used to dissect metabolic and development processes in bacteria, archaea, and selected microbial eukaryotes. Genetic mechanisms integrated with genomic information to address integration and diversity of microbial processes. Introduction to the use of computational tools for a comparative analysis of microbial genomes and determining relationships among bacteria, archaea, and microbial eukaryotes.
Rules & Requirements

Prerequisites: Molecular and Cell Biology C100A/Chemistry C130 or Molecular and Cell Biology 102

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Plant and Microbial Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Brenner, Glass

Formerly known as: Plant and Microbial Biology 118

Also listed as: MCELLBI C148

PLANTBI 150 Plant Cell Biology 3 Units
An introduction to the structure, dynamics, and function of plant cells: organelle structure and development; intracellular trafficking of small and macromolecules; cellular signaling; cell division and specialization.
Rules & Requirements

Prerequisites: BIOLOGY 1A-1B

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Plant and Microbial Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Luan, Sung

PLANTBI 160 Plant Molecular Genetics 3 Units
A consideration of plant genetics and molecular biology. Principles of nuclear and organellar genome structure and function: regulation of gene expression in response to environmental and developmental stimuli; clonal analysis; investigation of the molecular and genetic bases for the exceptional cellular and developmental strategies adopted by plants.
Rules & Requirements

Prerequisites: BIOLOGY 1A-1B

Hours & Format

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

Additional Details

Subject/Course Level: Plant and Microbial Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Fischer, Fletcher

PLANTBI 165 Plant-Microbe Interactions 3 Units
This course will cover topics in molecular plant-microbe interactions ranging from how microbes cause disease to how plants defend themselves. A second goal of the course is to engage students in state-of-the-art research in the area of plant-microbe interactions.
Rules & Requirements

Prerequisites: BIOLOGY 1A-1B, Statistics 2 or 20 or 131A or Public Health 142. Completion of an upper division plant biology and an upper division microbiology course is recommended

Hours & Format

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

Additional Details

Subject/Course Level: Plant and Microbial Biology/Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Instructors: Somerville, Baker, Lewis

PLANTBI 170 Modern Applications of Plant Biotechnology 2 Units
This course is designed to introduce students to the principles and applications of modern plant biotechnology. Basic concepts of modern agriculture will be reviewed in light of emerging biotechnology applications. Emphasis will be placed on understanding the tools and strategies involved in optimizing plant productivity.
Rules & Requirements

Prerequisites: BIOLOGY 1A-1B

Hours & Format

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

Additional Details

Subject/Course Level: Plant and Microbial Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Baker, Somerville

PLANTBI 180 Environmental Plant Biology 2 Units
An integrated and multidisciplinary approach to the study of interactions between plants and the environment. Introduces physical parameters in the global and micro-environment that affect plant function; and molecular, cellular, and developmental aspects of plant response to suboptimal/adverse conditions. Underlying biochemistry, physiology, and molecular biology of plant adaptation and acclimation mechanisms. Examines consequences of industrial activity on plant growth and productivity.
Rules & Requirements

Prerequisites: BIOLOGY 1A-1B

Hours & Format

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

Additional Details

Subject/Course Level: Plant and Microbial Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Terry

PLANTBI 185 Techniques in Light Microscopy 3 Units
The course will be a detailed overview of the practice of light microscopy as applied to scientific investigation. The emphasis of the course will be on the correct and appropriate use of the light microscope for biological scientists; however students of other disciplines are welcome. The course will cover optical microscope theory, microscope components and mechanics, and optical techniques including detailed descriptions, demonstrations, and use of all the modern light microscope contrast methods. Students will receive hands-on experience in all microscope and digital imaging techniques via direct instruction and use of instrumentation in the College of Natural Resources Biological Imaging Facility.
Hours & Format

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

Additional Details

Subject/Course Level: Plant and Microbial Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Ruzin

PLANTBI 190 Special Topics in Plant and Microbial Biology 1 - 4 Units
This class is designed to develop skills in critical analysis of specific plant and/or microbial biology issues. Topics may vary from semester to semester.
Rules & Requirements

Prerequisites: Upper division standing or consent of instructor

Repeat rules: Course may be repeated for credit as topic varies. Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of lecture per week

Summer: 6 weeks - 2.5-10 hours of lecture per week

Additional Details

Subject/Course Level: Plant and Microbial Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

PLANTBI C192 Molecular Approaches to Environmental Problem Solving 2 Units
Seminar in which students consider how modern biotechnological approaches, including recombinant DNA methods, can be used to recognize and solve problems in the area of conservation, habitat and endangered species preservation, agriculture and environmental pollution. Students will also develop and present case studies of environmental problems solving using modern molecular methods.
Rules & Requirements

Prerequisites: Junior or senior standing in the Genetics and Plant Biology or Microbial Biology major, or consent of instructor

Hours & Format

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

Additional Details

Subject/Course Level: Plant and Microbial Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Lindow

Formerly known as: Environ Sci, Policy, and Management 192

Also listed as: ESPM C192

PLANTBI H196 Honors Research - Plant and Microbial Biology 4 Units
Supervised independent honors research specific to aspects of the plant and microbial biology major, followed by an oral presentation and a written report. Honors students must complete two semesters of research.

Rules & Requirements

Prerequisites: Upper division standing and minimum GPA. See College of Natural Resources Honors website for current minimum GPA. http://nature.berkeley.edu/site/honors_program.php

Repeat rules: Course may be repeated for credit. Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of independent study per week

Summer: 8 weeks - 1.5-7.5 hours of independent study per week

Additional Details

Subject/Course Level: Plant and Microbial Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.

PLANTBI 198 Directed Group Studies in Plant Biology 1 - 3 Units
Group studies of selected topics.

Rules & Requirements

Prerequisites: Consent of instructor

Repeat rules: Course may be repeated for credit. Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 1-3 hours of directed group study per week

Additional Details

Subject/Course Level: Plant and Microbial Biology/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

PLANTBI 199 Supervised Independent Study and Research 1 - 4 Units
Enrollment restrictions apply; see the Introduction to Courses and Curricula section of this catalog.

Rules & Requirements

Prerequisites: Consent of instructor; overall GPA of 3.0

Repeat rules: Course may be repeated for credit. Course may be repeated for credit when topic changes.

Hours & Format

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

Summer:
6 weeks - 1-3 hours of independent study per week
8 weeks - 1-3 hours of independent study per week

Additional Details

Subject/Course Level: Plant and Microbial Biology/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.