Molecular Environmental Biology

Bachelor of Science (BS)

The Molecular Environmental Biology (MEB) major is designed to expose students to the organization and function of biological organisms. Molecular approaches are expected to play an increasing role in environmental problem-solving in the near future, and their success will depend upon a sound understanding of biological principles from molecular through ecological levels. The program trains students in the organization and function of biological organisms and their integration into the environment.

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, students should see the College of Natural Resources Undergraduate Student Handbook (http://www.cnr.berkeley.edu/site/forms/oisa/undergrad_handbook.pdf) .

Honors Program

Students with a grade point average (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 further information on registering for the Honors Symposium and on Honors requirements, please see the College of Natural Resources website (http://nature.berkeley.edu/site/honors_program.php) .

Minor Program

There is no minor program in Molecular Environmental Biology.

Other Majors and Minors Offered by the Department of Environmental Science, Policy, and Management

Conservation and Resource Studies (http://guide.berkeley.edu/archive/2014-15/undergraduate/degree-programs/conservation-resource-studies) (Major and Minor)
Environmental Sciences (http://guide.berkeley.edu/archive/2014-15/undergraduate/degree-programs/environmental-sciences) (Major only)
Forestry and Natural Resources (http://guide.berkeley.edu/archive/2014-15/undergraduate/degree-programs/forestry-natural-resources) (Major and Minor)
Society and Environment (http://guide.berkeley.edu/archive/2014-15/undergraduate/degree-programs/society-environment) (Major only)

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/No 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.

Areas of Concentration

1. Animal Health & Behavior
2. Biodiversity
3. Ecology
4. Environment & Human Health
5. Insect Biology/Anthropod Science
6. Microbiology

Summary of Major Requirements

Lower-division Requirements	
Upper-division Requirements	
Biological Core: Seven courses	
Lab Requirement: Two courses, selected as part of either the Biological Core or Area of Concentration requirements	
Area of Concentration: 12 units	

Please see below for the specific details regarding these requirements.

Lower-division Requirements

ESPM Environmental Science Core

Select one of the following:	
ENV SCI 10	Introduction to Environmental Sciences
ESPM 2	The Biosphere
ESPM 6	Environmental Biology
ESPM C10	Environmental Issues
ESPM 15	Introduction to Environmental Sciences

ESPM Social Science Core		
Select one of the following:		
ESPM C11	Americans and the Global Forest	4
ESPM C12	Introduction to Environmental Studies	4
or ENGLISH C77	Introduction to Environmental Studies	
or ESPM 50AC	Introduction to Culture and Natural Resource Management	
or ESPM 60	Environmental Policy, Administration, and Law	
CHEM 1A & 1AL	General Chemistry and General Chemistry Laboratory	4
CHEM 3A & 3AL	Chemical Structure and Reactivity and Organic Chemistry Laboratory	5
CHEM 3B & 3B	Chemical Structure and Reactivity and Chemical Structure and Reactivity	6
BIOLOGY 1A & 1AL	General Biology Lecture and General Biology Laboratory	5
BIOLOGY 1B	General Biology Lecture and Laboratory	4
MATH 16A	Analytic Geometry and Calculus [1]	3
MATH 16B	Analytic Geometry and Calculus [1]	3
PHYSICS 8A	Introductory Physics [2]	4

1 For students in areas of concentration 2 (Biodiversity), 3 (Ecology), or 5 (Insect Biology/Anthropod Science), MATH 1A and MATH 1B can be substituted for MATH 16A and MATH 16B.

2 Fore pre-med students, PHYSICS 8B is required in addition to PHYSICS 8A.

Upper-division Requirements, Biological Core

15 upper-division units must be taken in the College of Natural Resources

Select one course from each of the seven categories below. With the exception of the lab courses, each course can be used to satisfy only one requirement; courses selected for the Biological Core requirement cannot overlap with those selected for the Area of Concentration requirement.

Biochemistry		
CHEM 135	Chemical Biology	3
MCELLBI 102	Survey of the Principles of Biochemistry and Molecular Biology	4
MCELLBI 110	Molecular Biology: Macromolecular Synthesis and Cellular Function	4
Molecular Biology/Genetics		
PLANTBI 160	Plant Molecular Genetics	3
INTEGBI 141	Human Genetics	3
INTEGBI 161	Population and Evolutionary Genetics	4
INTEGBI 162	Ecological Genetics	4
INTEGBI 164	Human Genetics and Genomics (lab included)	4
MCELLBI 140	General Genetics	4
MCELLBI 110	Molecular Biology: Macromolecular Synthesis and Cellular Function	4
MCELLBI 104	Genetics, Genomics, and Cell Biology	4
Cell & Developmental Biology		
MCELLBI 130	Course Not Available	4
MCELLBI 130A	Cell and Systems Biology	4
MCELLBI 133L	Physiology and Cell Biology Laboratory	4
MCELLBI 141	Developmental Biology	4
MCELLBI 135E	Course Not Available	3
MCELLBI 137	Computer Simulation in Biology	3
PLANTBI/ MCELLBI C112	General Microbiology	4
PLANTBI C112L	General Microbiology Laboratory	2
PLANTBI 150	Plant Cell Biology	3
PB HLTH 162A	Public Health Microbiology	3
PB HLTH 162L	Public Health Microbiology Laboratory	1
Organismal Physiology		
ESPM 144	Insect Physiology	3
INTEGBI 132	Survey of Human Physiology	4
INTEGBI 140	Biology of Human Reproduction	4
INTEGBI 148	Comparative Animal Physiology	3
MCELLBI 136	Physiology	4
NUSCTX 103	Nutrient Function and Metabolism	3
PLANTBI/ MCELLBI C116	Microbial Diversity	3
PLANTBI 135	Physiology and Biochemistry of Plants	3
Organismal Diversity		
ESPM 106	American Wildlife: Identification and Conservation (lab included)	3
ESPM 108A	Trees: Taxonomy, Growth, and Structures (lab included)	3
ESPM 115B	Biology of Aquatic Insects	2
ESPM 132	Spider Biology (lab included)	4
ESPM C138/ PLANTBI C114/ MCELLBI C114	Introduction to Comparative Virology	4
ESPM 140	General Entomology (lab included)	4
INTEGBI 102LF	Introduction to California Plant Life with Laboratory	4
INTEGBI 103LF	Invertebrate Zoology with Laboratory	5
INTEGBI 104LF	Natural History of the Vertebrates with Laboratory	5
INTEGBI 168 & 168L	Systematics of Vascular Plants and Systematics of Vascular Plants with Laboratory	6
PLANTBI C102	Course Not Available	
or PLANTBI C102	Course Not Available	
PLANTBI 110 & 110L	Course Not Available and Course Not Available	4
PLANTBI 113	California Mushrooms (lab included)	3
PLANTBI/ MCELLBI C116	Microbial Diversity	3
PLANTBI 120 & 120L	Biology of Algae and Laboratory for Biology of Algae	4
Ecology		
ESPM 102A	Terrestrial Resource Ecology (lab included)	4
ESPM 110	Primate Ecology	4
ESPM 111	Ecosystem Ecology	4
ESPM 112	Microbial Ecology	3
ESPM 113	Insect Ecology	2
ESPM 114	Wildlife Ecology	3
ESPM 115C	Fish Ecology (lab included)	3

ESPM 116A	Course Not Available	3
or ESPM 116B	Range Ecology, Improvements, and Management	
or ESPM 116C	Tropical Forest Ecology	
ESPM 119	Chemical Ecology	2
ESPM 131	Soil Microbial Ecology	3
ESPM/INTEGBI C149	Molecular Ecology	4
INTEGBI 153	Ecology	3
INTEGBI 154 & 154L	Plant Ecology and Plant Ecology Laboratory	5
Senior Seminar		
ESPM 192	Course Not Available	
PLANTBI 170	Modern Applications of Plant Biotechnology	2

Lab Requirement

Select two upper-division courses which include a lab, as part of the Biological Core or Area of Concentration requirements.

Additionally, this requirement many be fulfulled by: (1) One 3-4 unit independent study lab (course numbered H196 or 199); Summer Forestry Field Camp; or the Moorea Field Study course.

Area of Concentration Requirement

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

1. Animal Health & Behavior

ANTHRO 135	Paleoethnobotany: Archaeological Methods and Laboratory Techniques (lab included)	4
ESPM C103/ INTEGBI C156	Principles of Conservation Biology	4
ESPM 106	American Wildlife: Identification and Conservation (lab included)	3
ESPM 110	Primate Ecology	4
ESPM 114	Wildlife Ecology	3
ESPM C126/ INTEGBI C144	Animal Behavior	4
ESPM 142	Insect Behavior	3
ESPM 145	Course Not Available	4
ESPM 146	Course Not Available	3
ESPM 146L	Medical and Veterinary Entomology Laboratory	1
ESPM 186	Management and Conservation of Rangeland Ecosystems	4
ESPM 188	Case Histories in Wildlife Management	2
INTEGBI 104LF	Natural History of the Vertebrates with Laboratory	5
INTEGBI C143A/ PSYCH C113	Biological Clocks: Physiology and Behavior	3
INTEGBI C143B/ PSYCH C116	Hormones and Behavior	3
INTEGBI 146	Course Not Available	
INTEGBI 148	Comparative Animal Physiology	3
INTEGBI 184	Course Not Available	2-4
or INTEGBI 184L	Morphology of the Vertebrate Skeleton with Laboratory	
INTEGBI 186	Course Not Available	4
PSYCH 121	Animal Cognition	3

2. Biodiversity

ESPM C103/ INTEGBI C156	Principles of Conservation Biology	4
ESPM 105	Course Not Available (lab included)	3
ESPM 106	American Wildlife: Identification and Conservation (lab included)	3
ESPM 108A	Trees: Taxonomy, Growth, and Structures (lab included)	3
ESPM 115B	Biology of Aquatic Insects	2
ESPM 132	Spider Biology (lab included)	4
ESPM 140	General Entomology (lab included)	4
ESPM 147	Field Entomology (“Ants,” “Beetles,” and “Spiders” (1 unit each) SP. All three courses must be completed to equal one “lab course”)	1
INTEGBI 102LF	Introduction to California Plant Life with Laboratory	4
INTEGBI 103LF	Invertebrate Zoology with Laboratory	5
INTEGBI 104LF	Natural History of the Vertebrates with Laboratory	5
INTEGBI 160	Evolution	4
INTEGBI 166	Evolutionary Biogeography	4
INTEGBI 168 & 168L	Systematics of Vascular Plants and Systematics of Vascular Plants with Laboratory	6
INTEGBI 173LF	Mammalogy with Laboratory	5
INTEGBI 174LF	Ornithology with Laboratory	4
INTEGBI 175LF	Herpetology with Laboratory	4
INTEGBI 183	Course Not Available	3
INTEGBI 183L	Evolution of the Vertebrates with Laboratory	4
PLANTBI C102 & C102L	Course Not Available and Course Not Available	4
PLANTBI 101 & 101L	Course Not Available and Experimental Plant Biology Laboratory	3
PLANTBI 110 & 110L	Course Not Available and Course Not Available	4
PLANTBI 113	California Mushrooms	3
PLANTBI/ MCELLBI C116	Microbial Diversity	3
PLANTBI 120 & 120L	Biology of Algae and Laboratory for Biology of Algae	4

3. Ecology

ESPM 105A	Sierra Nevada Ecology	4
ESPM 102A	Terrestrial Resource Ecology	4
ESPM C103/ INTEGBI C156	Principles of Conservation Biology	4
ESPM 110	Primate Ecology	4
ESPM C104/ ENVECON C115	Modeling and Management of Biological Resources	4
ESPM 111	Ecosystem Ecology	4
ESPM 112	Microbial Ecology	3
ESPM 113	Insect Ecology	2
ESPM 114	Wildlife Ecology	3
ESPM 115B	Biology of Aquatic Insects	2

ESPM 115C	Fish Ecology	3
ESPM 116B	Range Ecology, Improvements, and Management	3
ESPM 116C	Tropical Forest Ecology	3
ESPM 117	Urban Garden Ecosystems	4
ESPM 118	Agricultural Ecology	3
ESPM 119	Chemical Ecology	2
ESPM C130/ GEOG C136	Terrestrial Hydrology	4
ESPM 131	Soil Microbial Ecology	3
ESPM 134	Fire, Insects, and Diseases in Forest Ecosystems	3
ESPM 146 & 146L	Course Not Available and Medical and Veterinary Entomology Laboratory	4
ESPM 147	Field Entomology	1
ESPM/INTEGBI C149	Molecular Ecology	4
ESPM 152	Global Change Biology	3
ESPM 172	Photogrammetry and Remote Sensing	3
ESPM 173	Introduction to Ecological Data Analysis	3
ESPM 174	Design and Analysis of Ecological Research	4
ESPM C180	Air Pollution	3
ESPM 181A	Fire Ecology	3
ESPM 188	Case Histories in Wildlife Management	2
PLANTBI 180	Environmental Plant Biology	2
INTEGBI 102LF	Introduction to California Plant Life with Laboratory	4
INTEGBI 151	Plant Physiological Ecology	4
INTEGBI 153	Ecology	3
INTEGBI 154 & 154L	Plant Ecology and Plant Ecology Laboratory	5
INTEGBI C155/ ANTHRO C129D	Holocene Paleoecology: How Humans Changed the Earth	3

4. Environment & Human Health

ANTHRO 135	Paleoethnobotany: Archaeological Methods and Laboratory Techniques (lab included)	4
ESPM C126/ INTEGBI C144	Animal Behavior	4
ESPM C138/ PLANTBI C114/ MCELLBI C114	Introduction to Comparative Virology	4
ESPM 145	Course Not Available	2
ESPM 146L	Medical and Veterinary Entomology Laboratory	1
ESPM C148/ NUSCTX C114	Pesticide Chemistry and Toxicology	3
ESPM 152	Global Change Biology	3
ESPM/NUSCTX C159	Human Diet	4
ESPM 162	Bioethics and Society	4
ESPM C167	Environmental Health and Development	4
INTEGBI N116	Course Not Available (lab included)	4
INTEGBI 117	Medical Ethnobotany	2
INTEGBI 117LF	Medical Ethnobotany Laboratory	2
INTEGBI 131	General Human Anatomy	3
INTEGBI 131L	General Human Anatomy Laboratory	2
INTEGBI 137	Human Endocrinology	4
INTEGBI 140	Biology of Human Reproduction	4
INTEGBI C143A/ PSYCH C113	Biological Clocks: Physiology and Behavior	3
INTEGBI C143B/ PSYCH C116	Hormones and Behavior	3
MCELLBI 135A	Topics in Cell and Developmental Biology: Molecular Endocrinology	3
MCELLBI 150	Molecular Immunology	4
MCELLBI 165	Neurobiology of Disease	3
NUSCTX 103	Nutrient Function and Metabolism	3
NUSCTX 108A	Introduction and Application of Food Science	3
NUSCTX 110	Toxicology	4
NUSCTX C119	Course Not Available	3
NUSCTX 160	Metabolic Bases of Human Health and Diseases	4
NUSCTX 166	Nutrition in the Community	3
PLANTBI/ MCELLBI C103	Bacterial Pathogenesis	3
PLANTBI 180	Environmental Plant Biology	2
PB HLTH 103	Drugs, Health, and Society	2
PB HLTH 104A	Health Promotion in a College Setting	2
PB HLTH 105	Policy, Planning, and Evaluation of Health Promotion in a College Setting	3
PB HLTH 114	Course Not Available	3
PB HLTH 116	Seminar on Social, Political, and Ethical Issues in Health and Medicine	3
PB HLTH 150B	Introduction to Environmental Health Sciences	3
PSYCH 110	Introduction to Biological Psychology	3

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

Mission

Molecular Environmental Biology (MEB) focuses on biological organisms and the hierarchy of life, from molecules and genes through cells, organisms, communities and ecosystems. The breadth of this biological science program provides an important perspective for students who have a passion for biology and are interested in the application of biological principles to understand how organisms function in their environment. Also a pre-medical or pre-health science major, the discipline offers an array of six areas of concentration within biology: microbiology, animal health and behavior, insect biology, ecology, biodiversity, and environmental and human health.

Learning Goals for the Major

1. Holistic interdisciplinary thinking, that understanding the “big picture"
    a. Interdisciplinarity: The ability to understand and work across different disciplines
    b. Multiple processes: Recognition that biology and the environment involve multiple processes as do solutions to modern problems

   c. Interconnectedness: Understanding that biology and the environment are interconnected at many spatial, temporal, and hierarchical levels
   d. Global and international approaches: Appreciating that the environment is necessarily global in nature and solutions to problems require international approaches
2. Training in the hierarchy of biology
   a. Fundamentals of Science: Training in the cores areas of physics, chemistry, biology, and mathematics
   b. Quantitative skills: Necessary tools for addressing biological problems
   c. Biochemistry: An understanding of the fundamentals of biological chemistry including the properties of intermediary metabolites, the structure and function of biological macromolecules, and the logic of basis of genetics and gene expression
   d. Molecular biology/Genetics: The molecular biology of bacterial, archaeal and eukaryotic cells and their viruses, mechanisms of DNA replication, transcription, translation, nuclear and organellar genome structure and function and regulation of gene expression heritability, measures of selection, etc.
   e. Cell and developmental biology: Cell structure and function, embryonic and post-embryonic development and growth, and gene expression
   f. Organismal physiology: Understanding of physiological function whether microbial, animal or plant, or comparison between different systems
   g. Organismal diversity: Emphasis on the nature of diversity whether plant, animal, fungus, protist, bacteria, or virus, the history of the lineages and life itself, and how diversity is distributed, global threats, etc.
   h. Ecology: The nature of interactions, biotic or abiotic, that dictate organismal distributions in space and time
   i. Laboratory experiences: Laboratory experiences allow students to gain hands-on experience in scientific approaches and methods
   j. Capstone seminar: The major ends with a senior seminar in Molecular Approaches to Environmental Problem-Solving. This course is highly interdisciplinary and is specifically intended to illustrate how all of the levels and approaches to biology are complementary and applicable to assessing or solving real-world problems especially as it relates to environmental issues
3. Analysis and application for students that choose the Animal Health & Behavior area of concentration
   a. Interaction of health and environment: Understanding how the environment, whether internal or external, affects organism health and behavior
   b. Expertise in health: Examination of the health of organisms from either physiological or environmental perspectives
   c. Epizootics: An appreciation of the potential for diseases in animal populations to spill over into humans as is the case in avian influenza or even the origins of HIV
4. Analysis and application for students that choose the Biodiversity area of concentration
   a. Biodiversity science: Detailed understanding of morphological and ecological diversity of a given organismic lineage
   b. Origins and evolution of life: Basic understanding of systematics and phylogenetics
   c. Quantifying biology: Knowledge of various sampling and species identification techniques to collect data
   d. Informatics: Proficiency in database development and management
5. Analysis and application for students that choose the Ecology area of concentration
   a. Principles of Ecology: Detailed understanding of ecological principles including energy flow, hydrologic, and mineral cycles, factors limiting species distribution and population size, and characteristics of species, populations, and communities
   b. Ecological interactions: Interactions relevant to different organismic groups.
   c. Biodiversity: Understanding of the biology of communities and ecosystems.
6. Analysis and application for students that choose the Environment & Human Health area of concentration.
   a. Interaction of health and environment: Understanding of how the environment affects human health and well-being.
   b. Disease: Environmental epidemiology and the impacts of disease.
   c. Diet: Effects of nutrition and diet on human health.
7. Analysis and application for students who choose the Insect Biology area of concentration.
   a. Insects and biodiversity science: Understanding of major insects groups, relationships, and diversity.
   b. Insects and environmental science: Knowledge of the impacts of insects (positive and negative) in the environment.
   c. Quantifying insects and biology: Skills in collecting and identifying insects.
8. Analysis and application for students who choose the Microbiology area of concentration.
   a. Microbiology expertise: Expertise and competence in processes, patterns in microbiology, and the role of microbes in ecosystem function.
   b. Biodiversity: Understanding of microbial genetic and functional diversity, ecological factors impacting microbial spatial and temporal distribution.
   c. Microbiology and the environment: Microbiology in environmental science, including impacts on human health & well-being.
9. Basic skills in research, analysis, communication.
   a. Reading carefully: Ability to read for detail and comprehension.
   b. Writing accurately: Ability to write succinctly, clearly, with coherence.
   c. Thinking critically: Critical thinking through the exposure and synthesis of biological knowledge from courses and lab work.
   d. Using theoretical and empirical knowledge: Ability to synthesize and apply information obtained through theory and observations.
   e. Quantitative skills: Obtaining the quantitative skills necessary for the subdisciplines.
   f. Analysis: Ability to perceive, tackle, and solve problems in environmental science.

g. Research experience: Research experience to practice scientific approaches and methods. Work with a faculty mentor while participating in an undergraduate research program or designing an individual research project. Share research results or work in progress in the form of a paper, report, research poster, or public presentation.
h. Communication: Strong communication skills, both written and verbal, to prepare for independent research work or team projects.

10. Lifetime skills.
    a. Continuing appreciation for biological systems: To develop a passion for biology and its interconnections with the environment.
    b. Representing science: To become an advocate for the training and knowledge of science, particularly the biological disciplines.

Molecular Environmental Biology

MCELLBI 15 Current Topics in the Biological Sciences 2 Units
Students in this course will critically examine modern methods of biological investigations and their social implications. Relevant literature will be used to present basic biological concepts that address the cultural, technological and health aspects of current topics in the biological sciences. Designing and evaluating scientific questions will be stressed.
Rules & Requirements

Prerequisites: Suitable for freshmen who plan to major in a biological science

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 - 2 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

Instructor: Matsui

MCELLBI C31 Big Ideas in Cell Biology 3 Units
An introduction for students who do not intend to major in biology but who wish to satisfy their breadth requirement in Biological Sciences. Some major concepts of modern biology, ranging from the role of DNA and the way cells communicate, to interactions of cells and creatures with their environment, will be discussed without jargon and with attention to their relevance in contemporary life and culture.
Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

Instructor: Wilt

Also listed as: L & S C30X

MCELLBI 32 Introduction to Human Physiology 3 Units
A comprehensive introduction to human cell biology. The course will concentrate on basic mechanisms underlying human life processes, including cells and membranes; nerve and muscle function; cardiovascular, respiratory, renal, and gastrointestinal physiology; metabolism, endocrinology, and reproduction.
Rules & Requirements

Prerequisites: One year high school or college chemistry

Hours & Format

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

Summer: 8 weeks - 6 hours of lecture and 2 hours of discussion per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

Instructors: Machen, Ball

MCELLBI 32L Introduction to Human Physiology Laboratory 2 Units
Experiments and demonstrations are designed to amplify and reinforce information presented in 32. Exercises include investigations into the structure and function of muscle, nerve, cardiovascular, renal, respiratory, endocrine, and blood systems.

Rules & Requirements

Prerequisites: 32 or may be taken concurrently

Hours & Format

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

Summer:
6 weeks - 2 hours of lecture and 8 hours of laboratory per week
8 weeks - 2 hours of lecture and 6 hours of laboratory per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

Instructor: Ball

MCELLBI 41 Genetics and Society 3 Units
Basic communication of inheritance; gene mapping; gene expression and genetic disease in animals and humans; social inheritance of genetics.

Rules & Requirements

Prerequisites: Primarily for students not specializing in biology

Credit Restrictions: Students will receive no credit after taking Biology 1A, Biology 1B, or Letters and Science 18.

Hours & Format

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

Summer:
6 weeks - 7.5 hours of lecture per week
8 weeks - 6 hours of lecture and 2 hours of discussion per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

MCELLBI C44 Biology for Voters 3 Units
This is a Discovery Course for non-Biology majors designed to introduce lower-division college students to biology through the lens of the contemporary problems facing people, the planet and the species of the planet. Modern genetic contributions will be presented on such issues as genetic engineering of plants and animals, the emergence of new pathogens, the role of genetic variation among individuals, and the extent to which DNA is and isn't destiny. Each week will close with the presentation and discussion of a defining biological challenge facing the world.

Objectives & Outcomes

Student Learning Outcomes: The learning objectives will be, at one end, to understand what an experiment is, how is it controlled and what does one need to know about an experiment to be able to rely upon any conclusion. That is the fundamental issue in all science, and is frequently overlooked in many media accounts of science. A second objective is to learn enough of the language of biology to be able to ask the kind of informed questions that we would want all elected representatives to pay attention to. A third objective is for students to cultivate confidence that through non-specialized information sources they can become informed consumers of contemporary scientific thought, and to develop those habits of intellect to think about evidence in a scientific manner. A fourth objective is for students to enjoy the abundance of high quality books, articles and multimedia that will enable a lifetime of discovery outside the structure of a college course.

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

Instructors: Rine, Urnov

Also listed as: L & S C30Y

MCELLBI 50 The Immune System and Disease 3 Units
Course will discuss how the immune system resolves, prevents, or causes disease. A general overview of the immune system will be covered in the first five weeks followed by five weeks discussing infectious diseases including anthrax, mad cow, herpes, malaria, tuberculosis, and HIV. In addition, other lectures will focus on current immunology topics including vaccines, autoimmunity, allergy, transplantation, and cancer.
Rules & Requirements

Prerequisites: High school chemistry or Chemistry 1A and high school biology or BIOLOGY 1A. BIOLOGY 1AL is not required

Credit Restrictions: Students will receive no credit for 50 after taking 102 or C100A/Chemistry C130.

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

Instructor: Beatty

MCELLBI 55 Plagues and Pandemics 3 Units
Discussion of how infectious agents cause disease and impact society at large. We will examine historical and current examples of plagues and pandemics and consider the question of what we should do to ameliorate the impact of infectious disease in the future. The course is intended for non-majors and will begin by briefly providing necessary background in microbiology and immunology. The primary focus in each subsequent week, however, will be on discussing a particular infectious disease. The course will be broad in scope covering biological, historical, ethical and social implications of each disease.
Rules & Requirements

Credit Restrictions: Students will receive no credit for 55 after taking 100, C100A, 100B, 102, 103, C103, 150, Chemistry C130, Plant and Microbial Biology C103, and Public Health C102.

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

Instructors: Beatty, Vance

MCELLBI C61 Brain, Mind, and Behavior 3 Units
Introduction to human brain mechanisms of sensation, movement, perception, thinking, learning, memory, and emotion in terms of anatomy, physiology, and chemistry of the nervous system in health and disease. Intended for students in the humanities and social sciences and others not majoring in the biological sciences.
Rules & Requirements

Credit Restrictions: Students will receive no credit for Molecular and Cell Biology C61 after completing Molecular and Cell Biology 61, N61, W61, Psychology C61, Molecular and Cell Biology 104, C100A/ Chemistry C130, Molecular and Cell Biology 110, 130A, 136, 160, C160/ Neuroscience C160 or Integrative Biology 132. A deficient grade in Molecular and Cell Biology 61, N61, W61, or Psychology C61 may be removed by taking Molecular and Cell Biology C61/Psychology C61.<BR/ >

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

Instructor: Presti

Also listed as: PSYCH C61

MCELLBI W61 Brain, Mind, and Behavior 3 Units
This course deals with the structure and function of the human nervous system, with an emphasis on how brain physiology and chemistry are related to human behavior. This is a comprehensive introduction to the exciting field of contemporary neuroscience for students of all backgrounds and interests, including those from the humanities and social sciences, as well as physical and biological sciences. The Final Examination will be administered in a proctored setting. See Schedule of Classes for meeting information. This course is web-based.
Rules & Requirements

Credit Restrictions: Students will receive no credit for W61 after taking 61, C61, N61, or Letters and Science C30W. A deficient grade in 61, C61, N61, or Letters and Science C30W may be removed by taking W61.

Hours & Format

Summer:
6 weeks - 7 hours of web-based lecture and 2.5 hours of web-based discussion per week
8 weeks - 5.5-6 hours of web-based lecture and 1.5 hours of web-based discussion per week

Online: This is an online course.

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

Instructor: Presti

Formerly known as: N61

MCELLBI C62 Drugs and the Brain 3 Units
The history, chemical nature, botanical origins, and effects on the human brain and behavior of drugs such as stimulants, depressants, psychedelics, analgesics, antidepressants, antipsychotics, steroids, and other psychoactive substances of both natural and synthetic origin. The necessary biological, chemical, and psychological background material for understanding the content of this course will be contained within the course itself.

Rules & Requirements

Credit Restrictions: Students will receive no credit for C62 after taking 62, C100A/Chemistry C130, 102, 104, 110, 130A, 136, C160/ Neuroscience C160,
Integrative Biology 132, Letters and Science C30T, or Psychology C19 .

Hours & Format

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

Summer: 8 weeks - 4.5 hours of lecture per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

Instructor: Presti

Also listed as: L & S C30T/PSYCH C19

MCELLBI 63 Introduction to Functional Neuroanatomy 3 Units
This course emphasizes beginning anatomy of the brain and spinal cord to individuals interested in understanding the dynamics of motor and sensory functions in the human body. Students in the Departments of Education, Psychology, and Integrative Biology, as well as students interested in medicine and the life sciences, are especially encouraged to attend.

Hours & Format

Summer:
4 weeks - 12 hours of lecture per week
6 weeks - 7.5 hours of lecture per week
8 weeks - 6 hours of lecture per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

Instructor: Reyes

MCELLBI C64 Exploring the Brain: Introduction to Neuroscience 3 Units
This course will introduce lower division undergraduates to the fundamentals of neuroscience. The first part of the course covers basic membrane properties, synapses, action potentials, chemical and electrical synaptic interactions, receptor potentials, and receptor proteins. The second part of the course covers networks in invertebrates, memory and learning behavior, modulation, vertebrate brain and spinal cord, retina, visual cortex architecture, hierarchy, development, and higher cortical centers.

Rules & Requirements

Prerequisites: High school chemistry or Chemistry 1A; high school biology or BIOLOGY 1A. BIOLOGY 1AL is not required

Credit Restrictions: Students will receive no credit for Molecular and Cell Biology/Psychology C64 after taking Molecular and Cell Biology C61/Letters and Science C30W, 104, 100A/Chemistry C130, Molecular and Cell Biology 110, 130A, 136, 160, C160/Neuroscience C160, or Integrative Biology 132. Students may remove a deficient grade in Molecular and Cell Biology C64/Psychology C64 after Molecular and Cell Biology 64.

Hours & Format

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

Summer: 8 weeks - 4 hours of lecture and 2 hours of discussion per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

Instructor: Caporale

Also listed as: PSYCH C64

MCELLBI 84B 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 when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 1-2 hours of seminar per week

Summer:
6 weeks - 4-6 hours of seminar per week
8 weeks - 3-4 hours of seminar per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

MCELLBI 90A Freshman Seminars: Biochemistry and Molecular Biology 1 Unit
The Berkeley Seminar Program has been designed to provide new students with the opportunity to explore an intellectual topic with a faculty member in a small-seminar setting. Berkeley Seminars are offered in all campus departments, and topics vary from department to department and semester to semester.
Rules & Requirements

Prerequisites: Open to freshmen only

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

MCELLBI 90B Freshman Seminars: Cell and Developmental Biology 1 Unit
The Berkeley Seminar Program has been designed to provide new students with the opportunity to explore an intellectual topic with a faculty member in a small-seminar setting. Berkeley Seminars are offered in all campus departments, and topics vary from department to department and semester to semester.
Rules & Requirements

Prerequisites: Open to freshmen only

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

MCELLBI 90C Freshman Seminars: Genetics and Development 1 Unit
The Berkeley Seminar Program has been designed to provide new students with the opportunity to explore an intellectual topic with a faculty member in a small-seminar setting. Berkeley Seminars are offered in all campus departments, and topics vary from department to department and semester to semester.
Rules & Requirements

Prerequisites: Open to freshmen only

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

MCELLBI 90D Freshman Seminars: Immunology 1 Unit
The Berkeley Seminar Program has been designed to provide new students with the opportunity to explore an intellectual topic with a faculty member in a small-seminar setting. Berkeley Seminars are offered in all campus departments, and topics vary from department to department and semester to semester.
Rules & Requirements

Prerequisites: Open to freshmen only

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

MCELLBI 90E Freshman Seminars: Neurobiology 1 Unit
The Berkeley Seminar Program has been designed to provide new students with the opportunity to explore an intellectual topic with a faculty member in a small-seminar setting. Berkeley Seminars are offered in all campus departments, and topics vary from department to department and semester to semester.
Rules & Requirements

Prerequisites: Open to freshmen only

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

MCELLBI 91D Immunology 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.
Rules & Requirements

Prerequisites: Open to freshmen and sophomores only

Hours & Format

Fall and/or spring: 15 weeks - 2-4 hours of seminar per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

MCELLBI 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: Molecular and Cell Biology/Undergraduate

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

Instructor: Matsui

Also listed as: INTEGBI C96/PLANTBI C96

MCELLBI 98 Directed Group Study 1 - 4 Units
Lectures and small group discussions focusing on topics of interest, varying from semester to semester.
Rules & Requirements

Prerequisites: Freshmen and sophomores only

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 directed group study per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

MCELLBI 99 Supervised Independent Study 1 - 4 Units
Rules & Requirements

Prerequisites: 3.3 GPA and consent of instructor

Credit Restrictions: One unit of credit is given for every three hours of work in the lab per week to a maximum of 4 units.

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
10 weeks - 1.5-6 hours of independent study per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

MCELLBI 100B Biochemistry: Pathways, Mechanisms, and Regulation 4 Units
We survey cellular metabolic pathways, with focus on the underlying chemistry, bioenergetics, and mechanisms. We discuss signaling in the context of a physical chemical understanding of diffusion, transport and molecular interactions. We will highlight the intertwining of signaling and dysregulation with metabolic disorders and cancer, and the production of renewable chemicals such as biofuels. The course is designed for majors in the biochemistry and molecular biology, genetics and development, or immunology emphases.
Rules & Requirements

Prerequisites: C100A/Chemistry C130

Credit Restrictions: Students will receive 3 units for Molecular and Cell Biology 100B after taking Molecular and Cell Biology 102 and no credit after taking Chemistry 135.

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

Instructors: Kuriyan, Savage, Alper

MCELLBI C100A Biophysical Chemistry: Physical Principles and the Molecules of Life 4 Units
Thermodynamic and kinetic concepts applied to understanding the chemistry and structure of biomolecules (proteins, DNA, and RNA). Molecular distributions, reaction kinetics, enzyme kinetics. Bioenergetics, energy transduction, and motor proteins. Electrochemical potential, membranes, and ion channels.
Rules & Requirements

Prerequisites: Chemistry 3A or 112A, Mathematics 1A, BIOLOGY 1A and 1AL; Chemistry 3B or 112B recommended

Hours & Format

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

Summer: 8 weeks - 5.5 hours of lecture and 2 hours of discussion per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

Also listed as: CHEM C130

MCELLBI 102 Survey of the Principles of Biochemistry and Molecular Biology 4 Units
A comprehensive survey of the fundamentals of biological chemistry, including the properties of intermediary metabolites, the structure and function of biological macromolecules, the logic of metabolic pathways (both degradative and biosynthetic) and the molecular basis of genetics and gene expression.
Rules & Requirements

Prerequisites: BIOLOGY 1A, 1AL, and Chemistry 3B (or equivalent courses). Recommended: a course in physical chemistry

Credit Restrictions: Students will receive 2 units of credit for 102 after taking 100B or C100A/Chemistry C130. Students will receive no credit for 102 after taking 110 and any of 100B or C100A/Chemistry C130. No credit for 102 after taking Chemistry 135.

Hours & Format

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

Summer:
8 weeks - 6 hours of lecture and 2 hours of discussion per week
10 weeks - 4 hours of lecture and 2 hours of discussion per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

MCELLBI 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: Molecular and Cell Biology/Undergraduate

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

Instructor: Portnoy

Also listed as: PB HLTH C102/PLANTBI C103

MCELLBI 104 Genetics, Genomics, and Cell Biology 4 Units
This course will introduce students to key concepts in genetic analysis, eukaryotic cell biology, and state-of-the-art approaches in genomic medicine. Lectures will highlight basic knowledge of cellular processes with the basis for human diseases, particularly cancer. Prerequisite courses will have introduced students to the concepts of cells, the central dogma of molecular biology, and gene regulation. Emphasis in this course will be on eukaryotic cell processes, including cellular organization, dynamics, and signaling.
Rules & Requirements

Prerequisites: 102

Credit Restrictions: Students will receive 1 unit for Molecular and Cell Biology 104 after completing Molecular and Cell Biology 140 or C142/ Integrative Biology C163, or 3 units after completing Molecular and Cell Biology 110 or 130.

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

MCELLBI 110 Molecular Biology: Macromolecular Synthesis and Cellular Function 4 Units
Molecular biology of prokaryotic and eukaryotic cells and their viruses. Mechanisms of DNA replication, transcription, translation. Structure of genes and chromosomes. Regulation of gene expression. Biochemical processes and principles in membrane structure and function, intracellular trafficking and subcellular compartmentation, cytoskeletal architecture, nucleocytoplasmic transport, signal transduction mechanisms, and cell cycle control.
Rules & Requirements

Prerequisites: C100A (may not be taken concurrently); Plan 1 Emphasis 1 (BMB) majors should take 100B prior to 110

Credit Restrictions: Students will receive 3 units of credit for 110 after taking 104.

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

MCELLBI C110L General Biochemistry and Molecular Biology Laboratory 4 Units
Experimental techniques of biochemistry and molecular biology, designed to accompany the lectures in Molecular and Cell Biology 100B and 110.
Rules & Requirements

Prerequisites: 110 (may be taken concurrently)

Hours & Format

Fall and/or spring: 15 weeks - 2-2 hours of lecture and 6-8 hours of laboratory per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

Also listed as: CHEM C110L

MCELLBI 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: Molecular and Cell Biology/Undergraduate

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

Instructor: Ryan

Also listed as: PLANTBI C112

MCELLBI 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: Molecular and Cell Biology/Undergraduate

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

Instructors: Komeili, Taga

Also listed as: PLANTBI C112L

MCELLBI 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: Molecular and Cell Biology/Undergraduate

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

Instructors: Glaunsinger, Jackson

Also listed as: ESPM C138/PLANTBI C114

MCELLBI 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: Molecular and Cell Biology/Undergraduate

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

Instructor: Coates

Formerly known as: 116

Also listed as: PLANTBI C116

MCELLBI 118 The Cancer Karyotype: What it is and What it Does 1 Unit
Mutational cancer theories do not explain why cancers: 1) have clonal individual karyotypes; 2) have polygenic transcriptomes and phenotypes; 3) have flexible karyotypes, which evolve progressive malignancy and drug resistance, but maintain autonomy and even immortality; and 4) Why carcinogens induce cancer only after conspicuously long latent periods of years to decades. To answer these questions, this course tests a new karyotypic theory, which postulates that cancers evolve much like new species.
Rules & Requirements

Prerequisites: 102. 104 recommended

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

Instructor: Duesberg

MCELLBI 130A Cell and Systems Biology 4 Units
This course will provide a detailed discussion of a wide range of topics in cell biology emphasizing experimental approaches and key experiments that have provided important insights. The course is aimed at conveying an understanding of how cellular structure and function arise as a result of the properties of cellular macromolecules. An emphasis will be placed on the dynamic nature of cellular organization and will include a description of physical properties of cells (dimensions, concepts of free energy, diffusion, biophysical properties). Students will be introduced to quantitative aspects of cell biology and a view of cellular function that is based on integrating multiple pathways and modes of regulation (systems biology).
Rules & Requirements

Prerequisites: 102 and 104. Instructors may waive 104 prerequisite for non-Molecular and Cell Biology majors

Credit Restrictions: Students will receive no credit for 130A after taking 130.

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

MCELLBI 132 Biology of Human Cancer 4 Units
The course is designed for students interested in learning about the molecular and cell biology of cancer and how this knowledge is being applied to the prevention, diagnosis and therapy of cancer. Topics covered include tumor pathology and epidemiology; tumor viruses and oncogenes; intracellular signaling; tumor suppressors; multi-step carcinogenesis and tumor progression; genetic instability in cancer; tumor-host interactions; invasion and metastasis; tumor immunology; cancer therapy.
Rules & Requirements

Prerequisites: 102 or 110 (may be taken concurrently); BIOLOGY 1A, 1AL, 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: Molecular and Cell Biology/Undergraduate

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

Formerly known as: 135G

MCELLBI 133L Physiology and Cell Biology Laboratory 4 Units
Experimental analyses of central problems in cell biology and physiology using modern techniques, including DNA cloning and protein biochemistry, fluorescence microscopy of the cytoskeleton and organelles, DNA transfection and cell cycle analysis of cultured mammalian cells, RNA interference and drug treatments to analyze ion channel function in cell contractility and intracellular signaling, and somatosensation.
Rules & Requirements

Prerequisites: 104

Credit Restrictions: Students will receive no credit for 133L after taking 130L.

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of lecture and 7 hours of laboratory per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

MCELLBI 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: Molecular and Cell Biology/Undergraduate

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

Instructors: Cande, Karpen

Also listed as: PLANTBI C134

MCELLBI 135A Topics in Cell and Developmental Biology: Molecular Endocrinology 3 Units
Molecular mechanisms by which hormones elicit specific responses and regulate gene expression; hormone-receptor interaction; synthesis, transport and targeting of hormones, growth factors and receptors.
Rules & Requirements

Prerequisites: Molecular and Cell Biology 102, BIOLOGY 1A, 1AL, 1B, Chemistry 3A-3B or equivalent, or consent of instructor

Credit Restrictions: Students will receive no credit for Molecular and Cell Biology 135A after taking Physiology 142.

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

Instructor: Firestone

MCELLBI 136 Physiology 4 Units
Principles of mammalian (primarily human) physiology emphasizing physical, chemical, molecular and cellular bases of functional biology. The following topics will be covered: cellular and membrane ion and nonelectrolyte transport; cell and endocrine regulation; autonomic nervous system regulation; skeletal, smooth and cardiac muscle; cardiovascular physiology; respiration; renal physiology; gastrointestinal physiology. Discussion section led by Graduate Student Instructor will review material covered in lecture.
Rules & Requirements

Prerequisites: BIOLOGY 1A, 1AL, 1B, PHYSICS 8A. PHYSICS 8B recommended

Credit Restrictions: Students will receive no credit for 136 after Integrative Biology 132.

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

MCELLBI 137 Computer Simulation in Biology 3 Units
Modeling and computer simulation of dynamic biological processes using special graphical interfaces requiring very little mathematical or computer experience. Models are drawn from the current literature to teach concepts and technique. The later part of the course is a workshop for student-selected individual projects. Computer work may be done at home or in the university laboratory.
Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

Instructors: Macey, Oster

Formerly known as: 136L

MCELLBI 140 General Genetics 4 Units
In-depth introduction to genetics, including mechanisms of inheritance; gene transmission and recombination; transposable DNA elements; gene structure, function, and regulation; and developmental genetics. Some exams may be given in the evening.
Rules & Requirements

Prerequisites: BIOLOGY 1A and 1AL,BIOLOGY 1A

Credit Restrictions: Students will receive 1 unit of credit for Molecular and Cell Biology 140 after completing either Molecular and Cell Biology 104, C142, or Integrative Biology C163.,Students will receive 1 unit of credit for Molecular and Cell Biology 140 after completing Molecular and Cell Biology 104, C142, or Integrative Biology C163.

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

MCELLBI 140 General Genetics 4 Units
In-depth introduction to genetics, including mechanisms of inheritance; gene transmission and recombination; transposable DNA elements; gene structure, function, and regulation; and developmental genetics. Some exams may be given in the evening.
Rules & Requirements

Prerequisites: BIOLOGY 1A and 1AL,BIOLOGY 1A

Credit Restrictions: Students will receive 1 unit of credit for Molecular and Cell Biology 140 after completing either Molecular and Cell Biology 104, C142, or Integrative Biology C163.,Students will receive 1 unit of credit for Molecular and Cell Biology 140 after completing Molecular and Cell Biology 104, C142, or Integrative Biology C163.

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

MCELLBI 140L Genetics Laboratory 4 Units
Experimental techniques in classical and molecular genetics.
Rules & Requirements

Prerequisites: Molecular and Cell Biology 104 or 140. May be taken concurrently

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

MCELLBI 141 Developmental Biology 4 Units
An introduction to principles and processes of embryonic and post-embryonic development, stressing mechanisms of cell and tissue interactions, morphogenesis and regulation of gene expression.
Rules & Requirements

Prerequisites: 102 or C100A; BIOLOGY 1A, 1AL, and 1B; 110 or 130 recommended

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

Formerly known as: 131

MCELLBI 143 Evolution of Genomes, Cells, and Development 3 Units
This course is intended for upper-division undergraduates seeking an interactive course based on modern concepts in evolution and comparative genomics. The course will emphasize the contribution of molecular evolution to a series of seminal events in life's history: origin of life; origin of cells; origin of eukaryotes; origin of multicellularity; evolution of animal development; human origins.
Rules & Requirements

Prerequisites: BIOLOGY 1A-1B and Molecular and Cell Biology C100A or 102; 104 or 140 recommended

Credit Restrictions: Student will receive no credit for 143 after taking Integrative Biology 163.

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

Instructors: King, Levine, Patel

MCELLBI 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: Molecular and Cell 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: PLANTBI C148

MCELLBI 149 The Human Genome 3 Units
This is an upper division course for majors in MCB with an interest in an in-depth exploration of the forces that shape the human genome and the human population, as well as the ways that human genetic information can be used in medicine, ancestry and forensics. The course will combine lectures and discussion of research papers.
Rules & Requirements

Prerequisites: MCB 140, MCB 104 or equivalent

Credit Restrictions: Students will receive 2 units for Molecular and Cell Biology 149 after taking Integrative Biology 164.

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

Instructors: Eisen, Meyer, Rokhsar

MCELLBI 150 Molecular Immunology 4 Units
Fundamentals of immunology with emphasis on biochemical and molecular approaches to study of the immune system and its application in medicine and biotechnology. Topics covered include description of the immune system, antibody and T-cell receptor structure and function, genes of the immunoglobulin superfamily, cells and molecular mediators that regulate the immune response, allergy, autoimmunity, immunodeficiency, tissue and organ transplants, and tumor immunology.
Rules & Requirements

Prerequisites: C100A/Chemistry C130, or 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: Molecular and Cell Biology/Undergraduate

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

MCELLBI 150L Immunology Laboratory 4 Units
Experimental techniques in mammalian molecular biology and cellular immunology. Molecular techniques covered include PCR and recombinant DNA procedures such as gene cloning, gene transfer, DNA sequencing, Southern blot, and restriction mapping. Immunological techniques covered include cell culture and monoclonal antibody production, flow cytometry, ELISA, immunoprecipitation, and western blot.
Rules & Requirements

Prerequisites: Molecular and Cell Biology 150 (may be taken concurrently); consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 8 hours of laboratory and 1 hour of lecture per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

Formerly known as: Microbiology 103L

MCELLBI 160 Cellular and Molecular Neurobiology 4 Units
Comprehensive introductory survey of cellular and molecular neuroscience, including cellular neurophysiology, ion channel function, synaptic function and plasticity, sensory transduction, and brain development. Includes introduction to molecular basis of neurological disease. Analysis from the level of molecules to cells to simple circuits.
Rules & Requirements

Prerequisites: BIOLOGY 1A and 1AL. Prerequisite or co-requisite: PHYSICS 8B

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

Formerly known as: Molecular and Cell Biology C160/Neuroscience C160

MCELLBI 160L Neurobiology Laboratory 4 Units
Experimental analyses of properties and interactions of nerve cells and systems, illustrating principal features and current methods. Techniques employed include computer simulation of neuron properties, electrophysiological recording and stimulation of nerves and cells, digitally enhanced video imaging of outgrowth, fluorescence immunocytochemistry, analysis of sensory: CNS mapping, human-evoked potential recording, sensory psychophysics.
Rules & Requirements

Prerequisites: BIOLOGY 1A, 1AL; PHYSICS 8A-8B, Molecular and Cell Biology C100A/Chemistry C130 or 102; Molecular and Cell Biology 160; or equivalent

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of lecture and 8 hours of laboratory per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

MCELLBI 161 Circuit, Systems and Behavioral Neuroscience 4 Units
Comprehensive survey of circuits and systems neuroscience, including sensory and motor systems, learning and memory, neuromodulatory systems and brain state and higher functions.
Biological and computational principles of neural circuit function. Analysis from the level of small circuits to behavior.
Rules & Requirements

Prerequisites: Molecular and Cell Biology 160

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

MCELLBI 163 Mammalian Neuroanatomy 4 Units
Development, structure (gross and microscopic), and functional relationships of the mammalian nervous system.
Rules & Requirements

Prerequisites: BIOLOGY 1A. BIOLOGY 1AL is not required

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 2 hours of laboratory per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

MCELLBI 165 Neurobiology of Disease 3 Units
The molecular, cellular, and neural circuit basis of neurological disease. Includes neurochemistry and reward systems, neural development and its disorders, addiction, neurodegenerative and neuropsychiatric disorders. Students will read and discuss primary papers from the research literature.
Rules & Requirements

Prerequisites: Molecular and Cell Biology 160

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

Instructor: Caporale

MCELLBI 166 Biophysical Neurobiology 3 Units
Electrochemistry and ion transport phenomena, equivalent circuits, excitability, action potentials, voltage clamp and the Hodgkin-Huxley model. Biophysical properties of ion channels. Statistical and electrophysiological models of synaptic transmission, Quantitative models for dendritic structure and neuronal morphogenesis. Sensory transduction, cellular networks as computational devices, information processing and transfer.
Objectives & Outcomes

Course Objectives: 1) Derive equations for Nernst and GHK membrane potential from fundamental physics concepts.
2) Describe the experiments and theory underlying the Hodgkin-Huxley model.
3) Understand biophysical properties of gating particles called ion channels.
4) Apply and solve equivalent circuit models to describe resting and excitable cells, synaptic transmission and sensory transduction.
5) Use Poisson, Gaussian and binomial distributions to analyze the gating of ion channels, synaptic transmission, and absolute sensitivity of vision.
6) Model dendritic structure based on quantitative descriptors of shape and energy minimization theory.
7) Explain experiments and models of sensory transduction, neuronal integration and lateral inhibition.

Rules & Requirements

Prerequisites: BIOLOGY 1A, 1AL, PHYSICS 8A-8B, Chemistry 1A, 3A/3AL-3B, or consent of instructor

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

Instructors: Elul, Isacoff, Miller

MCELLBI 180 Undergraduate Teaching of Biology 1A Laboratory 1 or 2 Units
Course consists of a weekly three-hour training session that focuses on laboratory techniques, instructional aids, and problem solving, plus an additional three hour weekly laboratory where the UGSI is required to assist a GSI in the instruction of laboratory (answering questions, providing demonstrations, etc.).
Rules & Requirements

Prerequisites: BIOLOGY 1A, 1AL with a minimum grade of B. Appointment as a UGSI in biology by consent of instructor. Restricted to undergraduate students

Repeat rules: Course may be repeated for a maximum of 4 units.Course may be repeated for a maximum of 4 units.

Hours & Format

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

Summer: 8 weeks - 3 hours of session per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

MCELLBI 180C Undergraduate Teaching of Molecular and Cell Biology 32 Laboratory 1 - 2 Units
Course consists of a weekly three-hour training session that focuses on laboratory techniques, instructional aids, and problem solving, plus an additional three-hour weekly laboratory where the UGSI is required to assist a GSI in the instruction of laboratory (answering questions, providing demonstrations, etc.). Students will be graded on lecture and laboratory attendance and preparation of one quiz.
Rules & Requirements

Prerequisites: 32, 136, or Integrative Biology 132 and Molecular and Cell Biology 32L or Integrative Biology 132L laboratory courses in physiology with minimum grades of B. Appointment as a UGSI in physiology by consent of instructor

Repeat rules: Course may be repeated for a maximum of 4 units.Course may be repeated for a maximum of 4 units.

Hours & Format

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

Summer:
6 weeks - 8 hours of session per week
8 weeks - 6 hours of session per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

MCELLBI H196A Honors Research 1 - 4 Units
Individual research and thesis preparation under the supervision of a faculty member. Acceptance to the Molecular and Cell Biology Honors Program is required. Contact the MCB Undergraduate Affairs Office, 3060 Valley Life Sciences Building, for application and details. Honor students must complete at least two semesters of research, taking a minimum of 4 units and a maximum of 8 units of H196A-196B. If desired, one semester of 199 can be used to replace H196A.
Rules & Requirements

Prerequisites: Senior honors status and consent of instructor

Repeat rules: Course may be repeated for a maximum of 4 units.

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: Molecular and Cell Biology/Undergraduate

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

MCELLBI H196B Honors Research 1 - 4 Units
Individual research and completion of thesis under the supervision of a faculty member. This course satisfies the thesis requirement for the Molecular and Cell Biology Department Honors Program. Contact the MCB Undergraduate Affairs Office, 3060 Valley Life Sciences Building, for program details and an application. Honor students must complete at least two semesters of research, taking a minimum of 4 units and a maximum of 8 units of H196A-196B. One semester of H196B is required.
Rules & Requirements

Prerequisites: Senior honors status and consent of instructor

Repeat rules: Course may be repeated for a maximum of 4 units.

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: Molecular and Cell Biology/Undergraduate

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

MCELLBI 197 Supervised Internship 1 Unit
Supervised experience relevant to specific topics of biology in off-campus organizations. Written report and evaluation from internship supervisor required.
Rules & Requirements

Prerequisites: Consent of MCB Faculty, restricted to MCB majors and prospective majors only. Certification from supervisor that credit is required

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

Hours & Format

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

Summer: 8 weeks - 6 hours of internship per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

MCELLBI 198 Directed Group Study 1 - 4 Units
Lectures and small group discussions focusing on topics of interest, varying from semester to semester.
Rules & Requirements

Prerequisites: Upper division standing

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 directed group study per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

MCELLBI 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

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:
6 weeks - 1-4 hours of independent study per week
8 weeks - 1-4 hours of independent study per week
10 weeks - 1-4 hours of independent study per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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