Molecular and Cell Biology

Bachelor of Arts (BA)

The undergraduate major in Molecular and Cell Biology (MCB) focuses on the study of molecular structures and processes of cellular life and their roles in the function, reproduction, and development of living organisms. This covers a broad range of specialized disciplines, such as biochemistry, microbiology, biophysics, molecular biology, genetics, cell physiology, cell anatomy, immunology, and neurobiology. The types of living organisms from which the departmental faculty draws its working materials are as diverse as its disciplinary concentrations, ranging from viruses and microbes through plants, roundworms, annelids, arthropods, and mollusks, to fish, amphibia, and mammals.

There are six emphases (concentrations) in MCB:

- Biochemistry, Biophysics & Structural Biology
- Cell Biology, Development & Physiology
- Genetics, Genomics, Evolution & Development
- Immunology & Molecular Medicine
- Molecular Therapeutics
- Neurobiology *

All of the emphases except Neurobiology have multiple tracks to choose from. Some tracks only differ slightly and some give a whole different perspective on the emphasis. For help deciding your emphasis please see a staff or peer advisor in MCB!

*There is a new major Neuroscience which will replace MCB-Neurobiology. We will still accept declarations into MCB-Neurobiology until the end of Spring 2025 and all students who are declared MCB-Neurobiology will be allowed to complete the emphasis.

Declaring the Major

Students can receive pre-major advising at any time from staff or peer advisors. MCB will accept any interested student who meets the minimum course and GPA requirements and is realistically able to complete the major requirements during the student's time at UC Berkeley. Any student intending to major in MCB must finish declaring or complete MCB conditions to declare by the end of their 6th semester, or during the semester before their graduating term (if this semester is before their 6th semester).

In order to declare the MCB major, students must have completed or be enrolled in:

- BIOLOGY 1A/BIOLOGY 1AL (with a C or better on the first Bio 1A midterm) OR a score of 4 or 5 in AP Biology
- CHEM 3B (past the early drop deadline)
- Have at least a 2.0 overall GPA, a 2.0 GPA in all courses taken for the major, a 2.0 GPA in any upper division courses taken for the major

Intended MCB students are not required to have completed the math, physics, or Bio 1B requirements at the time of declaration (though these requirements must be met in order to graduate).

To start the major declaration process, students must complete the MCB major declaration form online (https://mcb.berkeley.edu/undergrad/declaring/). During major declaration, students must choose an MCB emphasis.

Once the declaration form has been processed, students will receive an email with instructions to schedule an appointment to meet with a staff advisor. Advising appointments take place either online on Zoom or in person at the Undergraduate Advising Office in 3060 Valley Life Sciences Building. See full instructions on the MCB Declaration page (https://mcb.berkeley.edu/undergrad/declaring/).

General Guidelines

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

1. All courses taken to fulfill the major requirements below must be taken for letter-graded credit.
2. No more than one upper division course may be used to simultaneously fulfill requirements for a student's major and minor programs. Double majors and simultaneous degrees are limited to a two-course overlap.
3. Students must maintain a minimum grade point average (GPA) of at least a 2.0 GPA overall, a 2.0 GPA in the required major coursework (lower and upper division), and a 2.0 GPA in the upper division coursework for the major.

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

Lower Division Requirements for All Emphases

Please note the alternative chemistry sequence for BBS Track 2.

MATH 10A & MATH 10B	Methods of Mathematics: Calculus, Statistics, and Combinatorics and Methods of Mathematics: Calculus, Statistics, and Combinatorics [1]	8
or		
MATH 51 & MATH 52	Calculus I and Calculus II (MATH 51 and 52 as of Fall 2025 - previously MATH 1A and MATH 1B)	4
CHEM 1A & 1AL	General Chemistry and General Chemistry Laboratory [2]	5
CHEM 3A & 3AL	Chemical Structure and Reactivity and Organic Chemistry Laboratory [3]	5
CHEM 3B & 3BL	Chemical Structure and Reactivity and Organic Chemistry Laboratory [3]	5
BIOLOGY 1A & 1AL	General Biology Lecture and General Biology Laboratory	5
BIOLOGY 1B	General Biology Lecture and Laboratory	4
PHYSICS 8A & PHYSICS 8B	Introductory Physics and Introductory Physics [4]	8

BBS Track 2 Alternative Chem sequence:		
Students in the Biochemistry, Biophysics & Structural Biology emphasis track 2 must take the following chemistry sequence:		
CHEM 1A & 1AL	General Chemistry and General Chemistry Laboratory	5
CHEM 1B	General Chemistry	4
CHEM 12A & CHEM 12B	Organic Chemistry and Organic Chemistry	10

[1] For alternative Math sequences please contact an MCB advisor at mcbuao@berkeley.edu
[2] CHEM 4A may be taken in place of CHEM 1A and CHEM 1AL.
[3] CHEM 12A and CHEM 12B may be taken place of CHEM 3A/CHEM 3AL and CHEM 3B/CHEM 3BL.
[4] PHYSICS 7A and PHYSICS 7B can be taken in place of PHYSICS 8A and PHYSICS 8B.

Upper-Division Requirements by Emphasis

MCB has six emphases (concentrations):

- Biochemistry, Biophysics & Structural Biology (p. 2)
- Cell Biology, Development & Physiology (p. 2)
- Genetics, Genomics, Evolution & Development (p. 2)
- Immunology & Molecular Medicine (p. 2)
- Molecular Therapeutics (p. 3)
- Neurobiology (p. 3)

All of these emphases except neurobiology have more than one track that students can choose from.

Biochemistry, Biophysics & Structural Biology

Track 1

MCELLBI C100A/ CHEM C130	Biophysical Chemistry: Physical Principles and the Molecules of Life	4
MCELLBI 100B	Biochemistry: Pathways, Mechanisms, and Regulation	4
MCELLBI 110	Molecular Biology: Macromolecular Synthesis and Cellular Function	4
MCELLBI 140 or MCELLBI C1	General Genetics Microbial Genomics and Genetics	4
MCELLBI/CHEM C110L	General Biochemistry and Molecular Biology Laboratory	4
One BBS Elective (see below)		4

TRACK 2

MCELLBI C100A/ CHEM C130	Biophysical Chemistry: Physical Principles and the Molecules of Life	4
CHEM 130B	Biophysical Chemistry	3
CHEM 135	Chemical Biology	3
MCELLBI C130 or MCELLBI 14	Cell Biology: from Discovery to Disease General Genetics	4
MCELLBI C110L	General Biochemistry and Molecular Biology Laboratory	4
One BBS Elective (see below)		

Cell Biology, Development & Physiology

Track 1

MCELLBI 102	Survey of the Principles of Biochemistry and Molecular Biology	4
MCELLBI 104	Genetics, Genomics, and Cell Biology	4
MCELLBI C130	Cell Biology: from Discovery to Disease	4
MCELLBI 133L	Physiology and Cell Biology Laboratory	4
Two CDP Electives from List A (see below)		6-8

Track 2

MCELLBI 102	Survey of the Principles of Biochemistry and Molecular Biology	4
MCELLBI 104	Genetics, Genomics, and Cell Biology	4
MCELLBI 136	Physiology	4
MCELLBI 133L	Physiology and Cell Biology Laboratory	4
Two CDP Electives from List B (see below)		6-8

Genetics, Genomics, Evolution & Development

TRACK 1

MCELLBI C100A/ CHEM C130	Biophysical Chemistry: Physical Principles and the Molecules of Life	4
MCELLBI 110	Molecular Biology: Macromolecular Synthesis and Cellular Function	4
MCELLBI 140	General Genetics	4
MCELLBI 140L	Genetics Laboratory	4
One GGD Elective, from List A or List B (see below)		3-4
One GGD Elective from List B (see below)		3-4

Track 2

MCELLBI 102	Survey of the Principles of Biochemistry and Molecular Biology	4
MCELLBI 104 or MCELLBI 14	Genetics, Genomics, and Cell Biology General Genetics	4
MCELLBI 141	Developmental Biology	4
MCELLBI 140L	Genetics Laboratory	4
One GGED Elective from List A or List B (see below)		3-4
One GGED Elective from List B (see below)		3-4

Immunology & Molecular Medicine

TRACK 1

MCELLBI C100A/ CHEM C130	Biophysical Chemistry: Physical Principles and the Molecules of Life	4
MCELLBI 110	Molecular Biology: Macromolecular Synthesis and Cellular Function	4
MCELLBI 104 or MCELLBI 14	Genetics, Genomics, and Cell Biology General Genetics	4
MCELLBI 150	Molecular Immunology	4
MCELLBI 150L	Immunology Laboratory	4
One IMM Elective from List C (see below)		3-4

Track 2

MCELLBI 102	Survey of the Principles of Biochemistry and Molecular Biology	4
MCELLBI 104	Genetics, Genomics, and Cell Biology	4

or MCELLBI 14	General Genetics	
MCELLBI 150	Molecular Immunology	4
MCELLBI 150L	Immunology Laboratory	4
One IMM Elective from List A (see below)		3-4
One IMM Elective A or B (see below)		3-4

Track 3

MCELLBI 102	Survey of the Principles of Biochemistry and Molecular Biology	4
MCELLBI 104	Genetics, Genomics, and Cell Biology	4
or MCELLBI 14	General Genetics	
MCELLBI 150	Molecular Immunology	4
MCELLBI 153	Molecular Medicine	4
MCELLBI 150L	Immunology Laboratory	4
or MCELLBI 153L	Molecular Medicine Laboratory	
One IMM Elective from the Approved Elective list below		

Molecular Therapeutics

TRACK 1

MCELLBI C100A	Biophysical Chemistry: Physical Principles and the Molecules of Life	4
MCELLBI 140	General Genetics	4
MCELLBI 120	Therapeutics Discovery and Development	4
MCELLBI 120L	Therapeutics Discovery Laboratory	4
or MCELLBI C1	General Biochemistry and Molecular Biology Laboratory	
One MTX Elective A (see below)		
One MTX Elective B (see below)		

Track 2

MCELLBI 102	Survey of the Principles of Biochemistry and Molecular Biology	4
MCELLBI 104	Genetics, Genomics, and Cell Biology	4
MCELLBI 120	Therapeutics Discovery and Development	4
MCELLBI 120L	Therapeutics Discovery Laboratory	4
or MCELLBI C1	General Biochemistry and Molecular Biology Laboratory	
One MTX Elective A (see below)		
One MTX Elective B (see below)		

Neurobiology

MCELLBI 102	Survey of the Principles of Biochemistry and Molecular Biology	4
MCELLBI 104	Genetics, Genomics, and Cell Biology	4
NEU 100A	Cellular and Molecular Neurobiology (formerly MCELLBI 160)	4
NEU 100B	Circuit, Systems and Behavioral Neuroscience (formerly MCELLBI 161)	4
NEU 171L	Neurobiology Laboratory (formerly MCELLBI 160L or MCELLBI 163L)	4
or NEU 173L	Neuroanatomy Laboratory	

Upper Division Electives by Emphasis (Concentration)

The electives for each emphasis (concentration) are listed below:

- Biochemistry, Biophysics & Structural Biology (p. 3)
- Cell Biology, Development & Developmental Biology (p. 4)
- Genetics, Genomics, Evolution & Development (p. 5)
- Immunology & Molecular Medicine (p. 5)
- Molecular Therapeutics (p. 6)
- Neurobiology (p. 6)

Biochemistry, Biophysics & Structural Biology ELECTIVES (both tracks, minimum of one course)

CHEM 113	Advanced Mechanistic Organic Chemistry	3
CHEM 115	Organic Chemistry--Advanced Laboratory Methods	4
CHEM 130B	Biophysical Chemistry	3
ESPM C148/ NUSCTX C114	Pesticide Chemistry and Toxicology	3
MATH 110	Abstract Linear Algebra	4
MATH 127	Mathematical and Computational Methods in Molecular Biology	4
MCELLBI 100B	Biochemistry: Pathways, Mechanisms, and Regulation (Track 2 Only)	4
MCELLBI/ PLANTBI C103	Bacterial Pathogenesis	3
MCELLBI/ PLANTBI C112	General Microbiology	4
MCELLBI/ PLANTBI C114	Introduction to Comparative Virology	4
MCELLBI/ PLANTBI C116	Microbial Diversity	3
MCELLBI C117	Advanced Plant Biochemistry	4
MCELLBI C130	Cell Biology: from Discovery to Disease	4
MCELLBI 132	Biology of Human Cancer	4
MCELLBI/ PLANTBI C134	Genome Organization and Nuclear Dynamics	3
MCELLBI 135A	Topics in Cell and Developmental Biology: Molecular Endocrinology	3
MCELLBI 136	Physiology	4
MCELLBI 137L	Physical Biology of the Cell	4
MCELLBI 141	Developmental Biology	4
MCELLBI 143	Evolution of Genomes, Cells, and Development	3
MCELLBI/ PLANTBI C148	Microbial Genomics and Genetics	4
MCELLBI 149	The Human Genome	3
MCELLBI 150	Molecular Immunology	4
MCELLBI 153	Molecular Medicine	4
MCELLBI 166	Course Not Available	3
MCELLBI C175	Life Sciences, Business, and Entrepreneurship Capstone Course (restricted to LSBE students only)	4
NEU 100A	Cellular and Molecular Neurobiology	4

NEU 100B	Circuit, Systems and Behavioral Neuroscience	4
NEU 165	Neurobiology of Disease	3
PHYSICS 112	Introduction to Statistical and Thermal Physics	4
PHYSICS 177	Principles of Molecular Biophysics	3
PLANTBI 135	Physiology and Biochemistry of Plants	3
PLANTBI 150	Plant Cell Biology	3
PLANTBI 160	Plant Molecular Genetics	3
PB HLTH 141	Course Not Available	5
PB HLTH 142	Introduction to Probability and Statistics in Biology and Public Health	4
STAT C131A	Statistical Methods for Data Science	4

Cell Biology, Development & Physiology ELECTIVES

CDP ELECTIVE LIST A (Track 1, minimum of one course)

MCELLBI/ PLANTBI C103	Bacterial Pathogenesis	3
MCELLBI/ PLANTBI C112	General Microbiology	4
MCELLBI/ PLANTBI C114	Introduction to Comparative Virology	4
MCELLBI/ PLANTBI C116	Microbial Diversity	3
MCELLBI C117	Advanced Plant Biochemistry	4
MCELLBI 132	Biology of Human Cancer	4
MCELLBI/ PLANTBI C134	Genome Organization and Nuclear Dynamics	3
MCELLBI 135A	Topics in Cell and Developmental Biology: Molecular Endocrinology	3
MCELLBI 136	Physiology	4
MCELLBI 137L	Physical Biology of the Cell	4
MCELLBI 141	Developmental Biology	4
MCELLBI 143	Evolution of Genomes, Cells, and Development	3
MCELLBI C144	Evolution	4
MCELLBI/ PLANTBI C148	Microbial Genomics and Genetics	4
MCELLBI 149	The Human Genome	3
MCELLBI 150	Molecular Immunology	4
MCELLBI 153	Molecular Medicine	4
MCELLBI 166	Course Not Available	
MCELLBI C175	Life Sciences, Business, and Entrepreneurship Capstone Course (restricted to LSBE students only)	4
NEU 100A	Cellular and Molecular Neurobiology	4
NEU 100B	Circuit, Systems and Behavioral Neuroscience	4
NEU 165	Neurobiology of Disease	3

CDP Elective List B (Track 2, minimum of one course)

MCELLBI/ PLANTBI C103	Bacterial Pathogenesis	3
MCELLBI/ PLANTBI C112	General Microbiology	4
MCELLBI/ PLANTBI C114	Introduction to Comparative Virology	4
MCELLBI/ PLANTBI C116	Microbial Diversity	3
MCELLBI C117	Advanced Plant Biochemistry	4
MCELLBI C130	Cell Biology: from Discovery to Disease	4
MCELLBI 132	Biology of Human Cancer	4
MCELLBI/ PLANTBI C134	Genome Organization and Nuclear Dynamics	3
MCELLBI 135A	Topics in Cell and Developmental Biology: Molecular Endocrinology	3
MCELLBI 137L	Physical Biology of the Cell	4
MCELLBI 141	Developmental Biology	4
MCELLBI 143	Evolution of Genomes, Cells, and Development	3
MCELLBI C144	Evolution	4
MCELLBI/ PLANTBI C148	Microbial Genomics and Genetics	4
MCELLBI 149	The Human Genome	3
MCELLBI 150	Molecular Immunology	4
MCELLBI 153	Molecular Medicine	4
MCELLBI 166	Course Not Available	3
MCELLBI C175	Life Sciences, Business, and Entrepreneurship Capstone Course (restricted to LSBE students only)	4
NEU 100A	Cellular and Molecular Neurobiology	4
NEU 100B	Circuit, Systems and Behavioral Neuroscience	4
NEU 165	Neurobiology of Disease	3
INTEGBI 103LF	Invertebrate Zoology with Laboratory	5
INTEGBI 104LF	Natural History of the Vertebrates with Laboratory	5
INTEGBI 117 & 117LF	Medical Ethnobotany and Medical Ethnobotany Laboratory (Both courses must be taken to count as an elective.)	4
INTEGBI 123AL	Exercise and Environmental Physiology with Laboratory	5
INTEGBI 131	General Human Anatomy	3
INTEGBI 137	Human Endocrinology	4
INTEGBI 140	Biology of Human Reproduction	4
INTEGBI C143A/ PSYCH C113	Biological Clocks: Physiology and Behavior	3
INTEGBI 148	Comparative Animal Physiology	3
NUSCTX 103	Nutrient Function and Metabolism	4
NUSCTX 108A	Introduction and Application of Food Science	3
NUSCTX 110	Course Not Available	
NUSCTX 160	Metabolic Bases of Human Health and Diseases	4
NUSCTX 161A	Course Not Available	
PLANTBI 135	Physiology and Biochemistry of Plants	3
PLANTBI 150	Plant Cell Biology	3
PLANTBI 160	Plant Molecular Genetics	3
PSYCH 110	Introduction to Biological Psychology	3
PSYCH C113	Biological Clocks: Physiology and Behavior	3
PSYCH C116/ INTEGBI C143B	Hormones and Behavior	3
PB HLTH 141	Course Not Available	
PB HLTH 150B	Human Health and the Environment in a Changing World	3
PB HLTH 162A	Public Health Microbiology	4

PB HLTH 142	Introduction to Probability and Statistics in Biology and Public Health	4
STAT C131A	Statistical Methods for Data Science	4

GENETICS, GENOMICS, EVOLUTION & DEVELOPMENT ELECTIVES (both tracks, minimum of two courses: one from List A and one from List B *or* both from List B)

GGED Elective List A

CHEM 113	Advanced Mechanistic Organic Chemistry	3
CHEM 115	Organic Chemistry--Advanced Laboratory Methods	4
CHEM 130B	Biophysical Chemistry	3
ESPM C148/ NUSCTX C114	Pesticide Chemistry and Toxicology	3
ESPM 162	Bioethics and Society	4
MATH 110	Abstract Linear Algebra [1]	4
MCELLBI 100B	Biochemistry: Pathways, Mechanisms, and Regulation	4
MCELLBI/ PLANTBI C103	Bacterial Pathogenesis	3
MCELLBI/ PLANTBI C112	General Microbiology	4
MCELLBI/ PLANTBI C114	Introduction to Comparative Virology	4
MCELLBI/ PLANTBI C116	Microbial Diversity	3
MCELLBI C117	Advanced Plant Biochemistry	4
MCELLBI C130	Cell Biology: from Discovery to Disease	4
MCELLBI 135A	Topics in Cell and Developmental Biology: Molecular Endocrinology	3
MCELLBI 136	Physiology	4
MCELLBI C144	Evolution	4
MCELLBI 150	Molecular Immunology	4
MCELLBI 153	Molecular Medicine	4
MCELLBI 166	Course Not Available	
MCELLBI C175	Life Sciences, Business, and Entrepreneurship Capstone Course (restricted to LSBE students only)	4
NEU 100A	Cellular and Molecular Neurobiology	4
NEU 100B	Circuit, Systems and Behavioral Neuroscience	4
NEU 165	Neurobiology of Disease	3
NUSCTX C114/ ESPM C148	Pesticide Chemistry and Toxicology	3
PHYSICS 112	Introduction to Statistical and Thermal Physics [1]	4
PLANTBI 135	Physiology and Biochemistry of Plants	3
PLANTBI 150	Plant Cell Biology	3

GGED ELECTIVE LIST B

BIO ENG 131	Introduction to Computational Molecular and Cell Biology [1]	4
BIO ENG 143	Course Not Available	4
BIO ENG 144	Course Not Available [1]	4
CMPBIO 156	Human Genome, Environment and Public Health	4
ESPM 108B	Environmental Change Genetics	3
INTEGBI 161	Population and Evolutionary Genetics	4
INTEGBI 162	Ecological Genetics	4
INTEGBI 163	Course Not Available	
MATH 127	Mathematical and Computational Methods in Molecular Biology [1]	4
MCELLBI 132	Biology of Human Cancer	4
MCELLBI/ PLANTBI C134	Genome Organization and Nuclear Dynamics	3
MCELLBI 137L	Physical Biology of the Cell	4
MCELLBI 141	Developmental Biology (for track 1 students only)	4
MCELLBI 143	Evolution of Genomes, Cells, and Development	3
MCELLBI/ PLANTBI C148	Microbial Genomics and Genetics	4
MCELLBI 149	The Human Genome	3
PLANTBI/ MCELLBI C134	Genome Organization and Nuclear Dynamics	3
PLANTBI 160	Plant Molecular Genetics	3
PB HLTH 141	Course Not Available	5
PB HLTH 142	Introduction to Probability and Statistics in Biology and Public Health	4
PB HLTH 256	Human Genome, Environment and Public Health	4
STAT C131A	Statistical Methods for Data Science	4
STAT 134	Concepts of Probability [1]	4

IMMUNOLOGY & MOLECULAR MEDICINE ELECTIVES

IMM Elective List A (Track 2, minimum of two courses: one from List A and one from List B or both from List A)

MCELLBI/ PLANTBI C103	Bacterial Pathogenesis	3
MCELLBI/ PLANTBI C112	General Microbiology	4
MCELLBI/ PLANTBI C114	Introduction to Comparative Virology	4

IMM ELECTIVE LIST B

MCELLBI C130	Cell Biology: from Discovery to Disease	4
MCELLBI 132	Biology of Human Cancer	4
MCELLBI/ PLANTBI C134	Genome Organization and Nuclear Dynamics	3
MCELLBI 135A	Topics in Cell and Developmental Biology: Molecular Endocrinology	3
MCELLBI 136	Physiology	4
MCELLBI 141	Developmental Biology	4
MCELLBI 143	Evolution of Genomes, Cells, and Development	3
MCELLBI 149	The Human Genome	3
MCELLBI 153	Molecular Medicine	4
MCELLBI C175	Life Sciences, Business, and Entrepreneurship Capstone Course (restricted to LSBE students only)	4
MCELLBI 250	Advanced Immunology	4
NEU 100A	Cellular and Molecular Neurobiology	4
NEU 100B	Circuit, Systems and Behavioral Neuroscience	4

IMM ELECTIVE LIST C (Track 1, minimum of one course)

BIO ENG 131	Introduction to Computational Molecular and Cell Biology	4

MCELLBI 100B	Biochemistry: Pathways, Mechanisms, and Regulation	4
MCELLBI/ PLANTBI C103	Bacterial Pathogenesis	3
MCELLBI/ PLANTBI C112	General Microbiology	4
MCELLBI/ PLANTBI C114	Introduction to Comparative Virology	4
MCELLBI C130	Cell Biology: from Discovery to Disease	4
MCELLBI 132	Biology of Human Cancer	4
MCELLBI/ PLANTBI C134	Genome Organization and Nuclear Dynamics	3
MCELLBI 135A	Topics in Cell and Developmental Biology: Molecular Endocrinology	3
MCELLBI 141	Developmental Biology	4
MCELLBI 149	The Human Genome	3
MCELLBI 153	Molecular Medicine	4
MCELLBI C175	Life Sciences, Business, and Entrepreneurship Capstone Course (restricted to LSBE students only)	4
MCELLBI 250	Advanced Immunology	4

IMM elective list d (TRACK 3, minimum one course)

Molecular and Cell Biology		
MCELLBI C103	Bacterial Pathogenesis	3
MCELLBI C112	General Microbiology	4
MCELLBI C114	Introduction to Comparative Virology	4
MCELLBI C130	Cell Biology: from Discovery to Disease	4
MCELLBI 132	Biology of Human Cancer	4
MCELLBI C134	Genome Organization and Nuclear Dynamics	3
MCELLBI 135A	Topics in Cell and Developmental Biology: Molecular Endocrinology	3
MCELLBI 136	Physiology	4
MCELLBI 141	Developmental Biology	4
MCELLBI 149	The Human Genome	3
MCELLBI C175	Life Sciences, Business, and Entrepreneurship Capstone Course	4
MCELLBI 250	Advanced Immunology	4
NEU 100A	Cellular and Molecular Neurobiology	4
NEU 100B	Circuit, Systems and Behavioral Neuroscience	4
NEU 165	Neurobiology of Disease	3
Plant and Microbial Biology		
PLANTBI C103	Bacterial Pathogenesis	3
PLANTBI C112	General Microbiology	4
PLANTBI C114	Introduction to Comparative Virology	4
Bioengineering		
BIO ENG 131	Introduction to Computational Molecular and Cell Biology	4

Molecular Therapeutics electives

mtX elective List A: Process, ethics, and economics of drug discovery

MCELLBI 100B	Biochemistry: Pathways, Mechanisms, and Regulation	4
MCELLBI 110	Molecular Biology: Macromolecular Synthesis and Cellular Function	4
MCELLBI 153	Molecular Medicine	4
MCELLBI C175	Life Sciences, Business, and Entrepreneurship Capstone Course	4
BIO ENG 100	Ethics in Science and Engineering	3
BIO ENG 143	Course Not Available	4
CHM ENG 182	Nanoscience and Engineering Biotechnology	3
CHEM 121	Introduction to Computational Chemistry	3
NUSCTX 121	Course Not Available	3
PB HLTH 142	Introduction to Probability and Statistics in Biology and Public Health	4
STAT C131A	Statistical Methods for Data Science	4

mtX elective LIST B: Mechanisms of disease

MCELLBI C103	Bacterial Pathogenesis	3
MCELLBI C114	Introduction to Comparative Virology	4
MCELLBI 132	Biology of Human Cancer	4
MCELLBI 135A	Topics in Cell and Developmental Biology: Molecular Endocrinology	3
MCELLBI 136	Physiology	4
MCELLBI 149	The Human Genome	3
NEU 165	Neurobiology of Disease	3
NUSCTX 110	Course Not Available	4

NEUROBIOLOGY ELECTIVES (MINIMUM ONE COURSE)

BIO ENG 121	BioMEMS and Medical Devices	4
COG SCI/ PSYCH C127	Cognitive Neuroscience	3
INTEGBI 139	The Neurobiology of Stress	4
INTEGBI C143A/ PSYCH C113	Biological Clocks: Physiology and Behavior	3
INTEGBI C143B/ PSYCH C116	Course Not Available	
INTEGBI C144/ ESPM C126	Animal Behavior	4
MATH 110	Abstract Linear Algebra	4
MATH 127	Mathematical and Computational Methods in Molecular Biology	4
MATH 128A	Numerical Analysis	4
MATH 128B	Numerical Analysis	4
MCELLBI C130	Cell Biology: from Discovery to Disease	4
MCELLBI 132	Biology of Human Cancer	4
MCELLBI 135A	Topics in Cell and Developmental Biology: Molecular Endocrinology	3
MCELLBI 136	Physiology	4
MCELLBI 137L	Physical Biology of the Cell	4
MCELLBI 141	Developmental Biology	4
MCELLBI 150	Molecular Immunology	4
MCELLBI 153	Molecular Medicine	4
MCELLBI 166	Course Not Available	3
MCELLBI C175	Life Sciences, Business, and Entrepreneurship Capstone Course (restricted to LSBE students only)	4
NEU 171L	Neurobiology Laboratory	4

NEU 173L	Neuroanatomy Laboratory	4
NEU 165	Neurobiology of Disease	3
PHYSICS 112	Introduction to Statistical and Thermal Physics	4
PSYCH 117	Human Neuropsychology	3
PB HLTH 141	Course Not Available	
PB HLTH 142	Introduction to Probability and Statistics in Biology and Public Health	4
STAT C131A	Statistical Methods for Data Science	4

Undergraduate students must fulfill the following requirements in addition to those required by their major program.

For a detailed lists of L&S requirements, please see Overview tab to the right in this guide or visit the L&S Degree Requirements (https://lsadvising.berkeley.edu/degree-requirements/) webpage. For College advising appointments, please visit the L&S Advising (https://lsadvising.berkeley.edu/home/) Pages.

University of California Requirements

Entry Level Writing

All students who will enter the University of California as freshmen must demonstrate their command of the English language by fulfilling the Entry Level Writing requirement. Fulfillment of this requirement is also a prerequisite to enrollment in all reading and composition courses at UC Berkeley and must be taken for a letter grade.

American History and American Institutions

The American History and American Institutions requirements are based on the principle that all U.S. residents who have graduated from an American university should have an understanding of the history and governmental institutions of the United States.

Berkeley Campus Requirement

American Cultures

All undergraduate students at Cal need to take and pass this campus requirement course in order to graduate. The requirement offers an exciting intellectual environment centered on the study of race, ethnicity and culture of the United States. AC courses are plentiful and offer students opportunities to be part of research-led, highly accomplished teaching environments, grappling with the complexity of American Culture.

College of Letters & Science Essential Skills Requirements

Quantitative Reasoning

The Quantitative Reasoning requirement is designed to ensure that students graduate with basic understanding and competency in math, statistics, or computer/data science. The requirement may be satisfied by exam or by taking an approved course taken for a letter grade.

Foreign Language

The Foreign Language requirement may be satisfied by demonstrating proficiency in reading comprehension, writing, and conversation in a foreign language equivalent to the second semester college level, either by passing an exam or by completing approved course work taken for a letter grade.

Reading and Composition

In order to provide a solid foundation in reading, writing, and critical thinking the College of Letters and Science requires two semesters of lower division work in composition in sequence. Students must complete parts A & B reading and composition courses in sequential order by the end of their fourth semester for a letter grade.

College of Letters & Science 7 Course Breadth Requirements

Breadth Requirements

The undergraduate breadth requirements provide Berkeley students with a rich and varied educational experience outside of their major program. As the foundation of a liberal arts education, breadth courses give students a view into the intellectual life of the University while introducing them to a multitude of perspectives and approaches to research and scholarship. Engaging students in new disciplines and with peers from other majors, the breadth experience strengthens interdisciplinary connections and context that prepares Berkeley graduates to understand and solve the complex issues of their day.

Unit Requirements

- 120 total units
- Of the 120 units, 36 must be upper division units
- Of the 36 upper division units, 6 must be taken in courses offered outside your major department

Residence Requirements

For units to be considered in "residence," you must be registered in courses on the Berkeley campus as a student in the College of Letters & Science. Most students automatically fulfill the residence requirement by attending classes at Cal for four years, or two years for transfer students. In general, there is no need to be concerned about this requirement, unless you graduate early, go abroad for a semester or year, or want to take courses at another institution or through UC Extension during your senior year. In these cases, you should make an appointment to meet an L&S College adviser to determine how you can meet the Senior Residence Requirement.

Note: Courses taken through UC Extension do not count toward residence.

Senior Residence Requirement

After you become a senior (with 90 semester units earned toward your B.A. degree), you must complete at least 24 of the remaining 30 units in residence in at least two semesters. To count as residence, a semester must consist of at least 6 passed units. Intercampus Visitor, EAP, and UC Berkeley-Washington Program (UCDC) units are excluded.

You may use a Berkeley Summer Session to satisfy one semester of the Senior Residence requirement, provided that you successfully complete 6 units of course work in the Summer Session and that you have been enrolled previously in the college.

Modified Senior Residence Requirement

Participants in the UC Education Abroad Program (EAP), Berkeley Summer Abroad, or the UC Berkeley Washington Program (UCDC) may meet a Modified Senior Residence requirement by completing 24 (excluding EAP) of their final 60 semester units in residence. At least 12 of these 24 units must be completed after you have completed 90 units.

Upper Division Residence Requirement

You must complete in residence a minimum of 18 units of upper division courses (excluding UCEAP units), 12 of which must satisfy the requirements for your major.

Sample four-year plans are available on the Molecular & Cell Biology department website for each emphasis (concentration):

- Biochemistry, Biophysics & Structural Biology (http://mcb.berkeley.edu/undergrad/bbs/)
- Cell Biology, Development & Physiology (http://mcb.berkeley.edu/undergrad/cdp/)
- Genetics, Genomics, Evolution & Development (http://mcb.berkeley.edu/undergrad/gged/)
- Immunology & Molecular Medicine (http://mcb.berkeley.edu/undergrad/imm/)
- Molecular Therapeutics (https://mcb.berkeley.edu/undergrad/mtx/)
- Neurobiology (http://mcb.berkeley.edu/undergrad/neu/)

Mission

The Department of Molecular and Cell Biology (MCB) is a large department that is subdivided into five divisions: Biochemistry, Biophysics & Structural Biology (BBS); Cell Biology, Development & Physiology (CDP); Genetics, Genomics, Evolution, and Development (GGED); Immunology & Molecular Medicine (IMM); Molecular Therapeutics (MTX) and Neurobiology (NEU). All MCB students complete the same lower-division coursework to gain critical training in biology, mathematics, chemistry, and physics (except for BBS track 2 Biological Chemistry, please see the MCB website (http://mcb.berkeley.edu/undergrad/bmb/) for details). Most lower-division coursework is completed before the major declaration. Upon declaring the major, MCB students choose an emphasis and track, which determines the upper-division core courses they will take and elective choices from which they will choose. Students can choose among several areas of specialization; emphases are broadly defined along divisional lines and allow students to focus on a more defined topic within MCB. MCB students who elect to participate in independent research may choose from sponsoring research laboratories within any MCB division, or in laboratories outside the department (other Berkeley departments, LBNL, CHORI, UCSF, biotechnology companies). The MCB major provides excellent preparation for many careers and post-baccalaureate training programs, including graduate programs and health-related professional programs (e.g., medicine, dentistry, optometry, pharmacy), science writing, law school, biotechnology, teaching, and academic research.

Learning Goals for the Major

1. Describe basic biological concepts and principles.
2. Appreciate the different levels of biological organization, from molecules to ecosystems.
3. Understand that biology has a chemical, physical, and mathematical basis.
4. Explain the importance of the scientific method to understanding natural phenomena.
5. Effectively communicate scientific data and ideas, both orally and in writing.
6. Critically evaluate data, develop a hypothesis, and design experiments to address an interesting and novel problem.
7. Demonstrate advanced knowledge in a specialized field of molecular and cell biology.

Major maps are experience maps that help undergraduates plan their Berkeley journey based on intended major or field of interest. Featuring student opportunities and resources from your college and department as well as across campus, each map includes curated suggestions for planning your studies, engaging outside the classroom, and pursuing your career goals in a timeline format.

Use the major map below to explore potential paths and design your own unique undergraduate experience:

View the Molecular and Cell Biology Major Map. (https://discovery.berkeley.edu/getting-started/major-maps/molecular-cell-biology/)

MCB offers three types of undergraduate advising: staff advisers, faculty advisors, and peer advisors.

Staff Advisers

Staff academic advisors (aka Major Advisors) are trained to support students and assist them in successfully completing their MCB major. They are excellent resources for questions concerning administration and academics, or finding out about other available services. Students should see a staff adviser for the following:

- Ask questions about major requirements.
- Ask for advice about schedule planning.
- Declare the MCB major.
- Consult about research opportunities, graduate and professional schools, career opportunities, scholarships, and internships.
- Get information about research and enroll in research units.
- Request general assistance, advice, or information.
- Find out about upcoming events and programs.

Staff advisers are available for pre-scheduled appointments and short-notice appointments for specific services. If students would like to schedule an appointment, they can review their scheduling options on our Advising Services (https://mcb.berkeley.edu/undergrad/advising/advising-office/advising-services/) page for more information.

The general email address is mcbuao@berkeley.edu which is checked daily, Monday through Friday.

Faculty Advisers

Faculty advisors are MCB professors assigned to advise students about the MCB department, its courses, its research, and other academic issues. Students typically first meet with a faculty advisor when they declare an MCB major. Students should see their faculty advisers for the following:

- Receive guidance toward achieving academic and career goals.
- Ask questions about the content of MCB courses.
- Ask questions about biological research and about the field of biology in general.
- Ask for recommendations on which graduate schools to attend.
- Review and approve the major declaration plans after speaking with a UAO staff adviser.

For a list of advisors and their office hours, please see the department's website (http://mcb.berkeley.edu/undergrad/faculty-advisors-office-hours/). Faculty adviser office hours are effective from the first day of instruction until the final day of instruction for the fall and spring

semesters. Faculty advisers are not available for office hours during winter or summer break.

Peer Adviser Walk-in Services (PAWS)

Peer advisers are junior and senior MCB majors who volunteer their time to complement the UAO advising services by sharing their knowledge of and experience with lower-division requirements and upper-division classes, experience with student groups on campus, preparation for life beyond the BA, and use of various campus resources. To see the schedule and more information about who the peer advisers are and which courses they have taken, click here (https://mcb.berkeley.edu/undergrad/PAWS/).

Undergraduate Research

Under the guidance of a faculty member and/or research mentor, undergraduates in the MCB major may have the opportunity to work in a laboratory to gain valuable experience in scientific research. Interested students must take the initiative to make such arrangements. Over 70 % of MCB students work in a lab to gain valuable experience in scientific research. To get started, students should talk with classmates, peer advisers, a staff undergraduate adviser, graduate student instructors (GSIs), and faculty about their interest in learning more about laboratory research. For more information on research, see How to Find a Lab Position (http://mcb.berkeley.edu/undergrad/research/research/lab/).

Benefits of research:

- Science is a way to figure things out, so doing research will aid students in other aspects of their life. Students will ask and answer open-ended questions and link seemingly disconnected pieces of information to find results that were not predicted.
- Explore things at the cutting edge and that no one has explored before.
- Learn tenacity, problem-solving, and to be critical about the details because things have to be reproducible.
- Solve mysteries and experience the excitement of discovery.

Students may receive academic credit for their work by enrolling in an independent study course: MCELLBI 99/MCELLBI 199/MCELLBI 191 or MCELLBI H196A/MCELLBI H196B. Enrollment applications are due in the Undergraduate Advising Office by the **third Friday** of each semester. For application instructions, see our website (https://mcb.berkeley.edu/undergrad/research/research/mcb-199/).

Honors Program

The MCB honors program offers exceptional senior students recognition for outstanding academic achievement and excellence in research. To graduate with honors in the major, students must satisfy the following:

1. Complete at least two credited semesters of research including four to eight units of MCELLBI H196A and/or MCELLBI H196B (Honors Research).
2. Have a cumulative Berkeley grade point average (GPA) of at least 3.5 in all work completed at UC Berkeley.
3. Have at least a 3.5 GPA in the MCB major requirements or 3.5 GPA in MCB upper-division courses.
4. Present their research in an approved forum, such as an MCB symposium, the Undergraduate Poster Session, or other scientific meeting.
5. Write an honors thesis approved by an MCB faculty sponsor.

Additional information on the honors program is available in the Undergraduate Affairs Office and on the MCB website (http://mcb.berkeley.edu/undergrad/major/honors-program/honors/).

Other Research Opportunities

For additional resources for information regarding research opportunities, please see the links below:

Undergraduate Research Apprentice Program (URAP) (http://research.berkeley.edu/urap/)

Scholarship Connection (http://scholarships.berkeley.edu/)

Summer Research Opportunities (https://mcb.berkeley.edu/undergrad/summer/)

MCB Research Resilience Program (https://sites.google.com/berkeley.edu/mcb-researchresilience/home/)

Funding for Student Research

There are a variety of ways to support your research. The department recommends attending a workshop at the Office of Undergraduate Research (http://research.berkeley.edu/) or looking for funding opportunities on their website (http://research.berkeley.edu/opportunities/) or the Scholarship Connection website (http://scholarships.berkeley.edu/).

MCELLBI 15 Current Topics in the Biological Sciences 2 Units

Terms offered: Spring 2025, Spring 2024, Spring 2023
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 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 24 Freshman Seminars 1 Unit

Terms offered: Spring 2025, Fall 2024, Spring 2024
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. Final assessment to be decided by the instructor when the class is offered.

Rules & Requirements

Prerequisites: Open to freshmen only

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

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. Alternative to final exam.

Formerly known as: Molecular and Cell Biology 90A

MCELLBI C31 Big Ideas in Cell Biology 3 Units

Terms offered: Spring 2014, Spring 2012
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

Terms offered: Fall 2025, Summer 2025 8 Week Session, Fall 2024
A comprehensive introduction to human 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.

Instructor: Ball

MCELLBI 32L Introduction to Human Physiology Laboratory 2 Units

Terms offered: Fall 2025, Summer 2025 Second 6 Week Session, Fall 2024
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 38 Stem Cell Biology, Ethics and Societal Impact 3 Units

Terms offered: Spring 2025, Spring 2024, Spring 2023
Innovations in bioengineering and use of stem cells will significantly impact our ability to combat human disease, genetic disorders and physiological dysfunction. An understanding of human stem cell biology will be critical to make informed decisions on our health and public policy.
Rules & Requirements

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

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: Firestone, Ball

MCELLBI 41 Genetics and Society 3 Units

Terms offered: Spring 2016, Spring 2013, Summer 2012 8 Week Session

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 for Molecular and Cell Biology 41 after completing 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 50 The Immune System and Disease 4 Units

Terms offered: Spring 2025, Spring 2024, Spring 2023
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 Molecular and Cell Biology 50 after completing Molecular and Cell Biology 102, C100A/ Chemistry C130, or 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.

Instructor: Beatty

MCELLBI 55 Plagues and Pandemics 3 Units

Terms offered: Fall 2025, Summer 2025 Second 6 Week Session, Fall 2024
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 MCELLBI 55 after completing CHEM C130, MCELLBI 150, MCELLBI C103, MCELLBI 102, or CHEM 135.

Hours & Format

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

Summer: 6 weeks - 7.5 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 C75 Introduction to the Biotechnology Field and Industry 2 Units

Terms offered: Spring 2019
This course offers an introduction to the field of biotechnology and will cover the history of the field, its impact on medicine and society, key methodologies, important therapeutic areas, and the range of career options available in the biopharmaceutical industry. In addition to lectures on innovation and entrepreneurship, students will hear from lecturers with expertise ranging from molecular biology to clinical trial design and interpretation. Several case studies of historically impactful scientists, entrepreneurs, and biotherapeutic companies will be presented. Students will work in teams to create and develop novel biotechnology company ideas to present in class. Intended for students interested in the Biology +Business program.

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. Alternative to final exam.

Instructors: Kirn, Lasky

Formerly known as: Molecular and Cell Biology C95B/Undergrad. Business Administration C95B

Also listed as: UGBA C95B

MCELLBI 84B Sophomore Seminar 1 or 2 Units

Terms offered: Fall 2013, Spring 2013, Fall 2012
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 without restriction.

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 88 Immunotherapy of Cancer: Success and Failures 2 Units

Terms offered: Spring 2018, Spring 2017
We will work with a variety of datasets that describe a molecular view of cells and how they divide. We will learn about the processes that cause cells to become specialized (differentiate) and to give rise to cancer (transform). We will analyze data on genetic mutations in cancer that distinguish tumor cells from normal cells. We will learn how mutations are detected by the immune system and the basis of cancer immunotherapy. Finally we will analyze data on clinical trials of cancer immunotherapy to define the correlates of success in curing the disease. The students are expected to gain an understanding of data that reveals the basics of cell physiology and cancer, how immunotherapies of cancer work and their current limitations.

Rules & Requirements

Prerequisites: Foundations of Data Science: COMPSCI C8, DATASCI C8, INFO C8 or STAT C8

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

Instructor: Shastri

MCELLBI C96 Studying the Biological Sciences 1 Unit

Terms offered: Fall 2025, Fall 2024, Fall 2023
Students 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 courses, and as future science professionals.

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

Terms offered: Spring 2025, Fall 2024, Fall 2023
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 without restriction.

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

Terms offered: Spring 2012, Fall 2009, Spring 2009
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 without restriction.

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

Terms offered: Spring 2025, Spring 2024, Spring 2023
This course surveys cellular metabolism with a focus on the underlying bioenergetics, mechanisms, and chemistry. Lectures will cover major principles in the biochemistry of metabolism and also highlight selected topics including signaling, transport, metabolic engineering, and human diseases related to metabolic dysfunction. The course is designed for majors in the biochemistry and molecular biology, genetics and development, or immunology emphases.
Rules & Requirements

Prerequisites: 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.

Instructors: Savage, Zoncu, Marletta

MCELLBI C100A Biophysical Chemistry: Physical Principles and the Molecules of Life 4 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
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: CHEM 3A or CHEM 112A, MATH 51, BIOLOGY 1A, and BIOLOGY 1AL; CHEM 3B or CHEM 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

Terms offered: Fall 2025, Summer 2025 8 Week Session, Spring 2025
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 and CHEM 3B with minimum grades of C- (or equivalent courses). Recommended: a course in physical chemistry

Credit Restrictions: Students will receive no credit for 102 after taking 100B or C100A/Chemistry C130 or 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

Terms offered: Spring 2025, Spring 2024, Spring 2023
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: BIOLOGY 1A and CHEM 3B

Credit Restrictions: Students will receive no credit for MCELLBI C103 after completing PB HLTH 262.

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: PLANTBI C103

MCELLBI 104 Genetics, Genomics, and Cell Biology 4 Units

Terms offered: Fall 2025, Summer 2025 8 Week Session, Spring 2025
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: BIOLOGY 1A

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.

MCELLBI 110 Molecular Biology: Macromolecular Synthesis and Cellular Function 4 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
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

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

Terms offered: Fall 2025, Spring 2025, Fall 2024
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

Terms offered: Fall 2025, Summer 2025 10 Week Session, Fall 2024
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 - 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 3 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Students will become proficient in basic microbiology research methods and experimental design. The course covers fundamental principles and techniques of the microbiology lab including sterile technique, culturing, and microscopy. Students will learn these methods in the context of two structured, discovery-based research projects: predicting and analyzing the phenotypes of E. coli metabolic mutants, and isolating and characterizing bacteria with novel properties from environmental samples. Student will synthesize their results in the format of a Journal of Bacteriology research article and a scientific poster presentation.

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 2 hours 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: Komeili, Traxler

Also listed as: PLANTBI C112L

MCELLBI C114 Introduction to Comparative Virology 4 Units

Terms offered: Spring 2025, Spring 2024, Spring 2023
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 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: Glaunsinger

Also listed as: ESPM C138/PLANTBI C114

MCELLBI C116 Microbial Diversity 3 Units

Terms offered: Fall 2025, Fall 2024, Fall 2022
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 C117 Advanced Plant Biochemistry 4 Units

Terms offered: Spring 2025, Spring 2024, Spring 2023
Students will build on the central metabolic pathways to learn about plant-specific metabolism from a more mechanistic perspective, including photosynthesis, regulation of sugar and starch metabolism, chloroplast-based pathways of inorganic nutrient (nitrogen, sulfur) processing, N2 fixing in free-living and symbiotic bacteria, polyunsaturated fatty acid and oil biosynthesis and accumulation, secondary metabolism, cell-wall structure and biosynthesis. Instruction will focus on a research-based approach, including retrieving and researching the primary literature, and understanding experimental design in modern plant biochemistry.
Rules & Requirements

Prerequisites: A minimum grade of C- in MCELLBI C100A/CHEM C130, MCELLBI 102, MCELLBI 104, MCELLBI 140, PLANTBI 135, or equivalent

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

Instructor: Merchant

Also listed as: PLANTBI C136

MCELLBI 120 Therapeutics Discovery and Development 4 Units

Terms offered: Fall 2025, Fall 2024, Fall 2023
This class is designed to introduce students to crucial concepts that underlie the discovery and development of therapeutic modalities. It will cover questions of target discovery and validation; basic properties of therapeutic modalities, such as small molecules, designer proteins, or genome engineering approaches; the design and execution of chemical screens; the medicinal chemistry, pharmacodynamics and -kinetics that is required for drug development; and the steps needed to introduce a new modality into the clinic. Lectures are based on a combination of textbook readings and primary literature and summarized through case studies that highlight critical aspects of drug discovery and development.
Rules & Requirements

Prerequisites: MCELLBI 104 (can be taken concurrently) and MCELLBI C100A/CHEM C130 or MCELLBI 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.

Instructor: Urnov

MCELLBI 120L Therapeutics Discovery Laboratory 4 Units

Terms offered: Prior to 2007

This lab course will familiarize students with general principles of drug discovery and action. The first module focuses on aspects of small molecule function by comparing stoichiometric inhibitors and PROTAC molecules against the BTK kinase. Students will learn how to purify protein, monitor drug binding and in vitro efficiency, and determine effects on cell survival. The second module focuses on genomic therapies by introducing students to principles of CRISPR genome editing. Students will design genome editing strategies and cognate guide RNAs and then perform an editing experiment that replaces a catalytic Cys residue in BTK with Ser. Students will compare stoichiometric inhibitors against BTK to PROTAC in wildtype or mutant cells.

Rules & Requirements

Prerequisites: MCELLBI C100A or MCELLBI 102

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 C130 Cell Biology: from Discovery to Disease 4 Units

Terms offered: Spring 2025, Spring 2024

This course will investigate a wide range of topics in cell biology, focusing on modern and classic experimental approaches that have provided important insights, and the relevance of their findings to understanding human health and disease. We will emphasize the importance of quantitative understanding in research topics that are current areas of discovery. We aim to convey an understanding of how cellular structure and function arise as a result of the properties of macromolecules and how understanding the behavior of molecules is needed to explain how cells and organisms operate. This understanding thus also explains what happens when normal cellular functions are impacted, leading to cellular dysfunction and disease.

Rules & Requirements

Prerequisites: Upper Division Standing; MCELLBI 102 or MCELLBI C100A

Credit Restrictions: Students will receive no credit for MCELLBI 130 after completing MCELLBI 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.

Formerly known as: Molecular and Cell Biology 130

Also listed as: NUSCTX C130

MCELLBI 132 Biology of Human Cancer 4 Units

Terms offered: Fall 2025, Fall 2024, Fall 2023

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: Biology 1A, 1AL, 1B and MCELLBI 102; MCELLBI 110 or 104 (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.

Formerly known as: 135G

MCELLBI 133L Physiology and Cell Biology Laboratory 4 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
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: BIOLOGY 1A

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 Genome Organization and Nuclear Dynamics 3 Units

Terms offered: Spring 2025, Spring 2024, Fall 2022
This course focuses on the structure, functions, and dynamics of eukaryotic chromosomes and their organization within cell nuclei. All life on earth relies on genetic information, which is encoded within nucleic acids (DNA and RNA). Most organisms have DNA-based genomes; bacterial and archaeal genomes typically comprise a single circular DNA molecule, while the genomes of most eukaryotes are divided into a variable number of linear DNA molecules. These contiguous DNA strands, along with the associated proteins and other components that contribute to their organization and function, are known as “chromosomes.”
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: Dernburg, Karpen

Also listed as: PLANTBI C134

MCELLBI 135A Topics in Cell and Developmental Biology: Molecular Endocrinology 3 Units

Terms offered: Fall 2025, Fall 2024, Fall 2023
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: BIOLOGY 1A. Recommended: MCELLBI 102 or MCELLBI C110A/CHEM C130 (may be taken concurrently)

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

Terms offered: Fall 2025, Spring 2025, Fall 2024
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 Molecular and Cell Biology 136 after completing Integrative Biology 132.

Hours & Format

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

Summer:
6 weeks - 8 hours of lecture and 3 hours of discussion 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 137L Physical Biology of the Cell 4 Units

Terms offered: Spring 2025, Spring 2024, Spring 2022
Biology is being revolutionized by new experimental techniques that have made it possible to measure the inner workings of molecules, cells and multicellular organisms with unprecedented precision. The objective of this course is to explore this deluge of quantitative data through the use of biological numeracy. We will develop theoretical models that make precise predictions about biological phenomena. These predictions will be tested through the hands-on analysis of experimental data and by performing numerical simulations using Matlab. A laptop is required for this course, but no previous programming experience is required.

Hours & Format

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

Summer: 8 weeks - 6 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. Alternative to final exam.

Instructor: Garcia

MCELLBI 140 General Genetics 4 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
An in depth introduction to genes, their sexual and asexual transmission in individuals and populations, and gene regulation in prokaryotes and eukaryotes. Gene manipulation by recombination, molecular cloning and genome editing is presented in contexts ranging from fundamental mechanisms of chromosome biology to applications in development, aging and disease. Human genetic variation and quantitative evaluation are illuminated. Non-Mendelian and epigenetic modes of inheritance of transposable elements, prions and chromatin states are paired with discussions of groundbreaking technology rewriting the rules of how the genome is analyzed, with attention to the ethical considerations ranging from the history of eugenics to modern controversies.

Rules & Requirements

Prerequisites: Biology 1A and 1AL

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

Terms offered: Spring 2025, Spring 2024, Spring 2023
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

Terms offered: Spring 2025, Spring 2024, Spring 2023
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

Terms offered: Fall 2023, Fall 2016, Fall 2015
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.

Instructor: King

MCELLBI C144 Evolution 4 Units

Terms offered: Fall 2025, Fall 2024, Fall 2023
An analysis of the patterns and processes of organic evolution. History and philosophy of evolutionary thought; the different lines of evidence and fields of inquiry that bear on the understanding of evolution. The major features and processes of evolution through geologic times; the generation of new forms and new lineages; extinction; population processes of selection, adaptation, and other forces; genetics, genomics, and the molecular basis of evolution; evolutionary developmental biology; sexual selection; behavorial evolution; applications of evolutionary biology to medical, agricultural, conservational, and anthropological research.

Rules & Requirements

Credit Restrictions: Students will receive no credit for INTEGBI 160 after completing ZOOLOGY 109.

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: Whiteman

Formerly known as: Integrative Biology 160

Also listed as: INTEGBI C160

MCELLBI C146 Data Science for Biology 3 Units

Terms offered: Spring 2025, Spring 2024, Fall 2022
Biology has become a data science! This lab course aims for student curiosity to drive hands-on case studies and coding projects about biological applications of data science. The course design supports students' development of fundamental and transferable computational and statistical skills for critically thinking about and using data in biology. Ethical considerations are interwoven throughout. This course offers projects with multiple levels of sophistication and complexity, enabling participation for students with varying levels of experience.
PREREQUISITES: Biology 1A; Biology 1B (can be taken concurrently); Data C8 or equivalent statistics and programming experience

Objectives & Outcomes

Course Objectives: Students will become empowered to use basic coding approaches to access, work with, and analyze biological data
Students will learn how to appropriately apply statistical tests to biological data
Students will learn how to select and evaluate methods and tools for data analysis
Students will understand how to grapple with the ethical considerations of biological data

Rules & Requirements

Prerequisites: Biology 1A; Biology 1B (can be taken concurrently); Data C8 or equivalent statistics and programming experience

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

Grading/Final exam status: Letter grade. Alternate method of final assessment during regularly scheduled final exam group (e.g., presentation, final project, etc.).

Instructors: Brenner, Eisen

Also listed as: BIO ENG C146/CMPBIO C146/PLANTBI C146

MCELLBI C148 Microbial Genomics and Genetics 4 Units

Terms offered: Spring 2025, Spring 2024, Spring 2023
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

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

Instructors: Brenner, Taga

Also listed as: PLANTBI C148

MCELLBI 149 The Human Genome 3 Units

Terms offered: Fall 2025, Fall 2024, Fall 2023
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: MCELLBI 110 and MCELLBI 140, MCELLBI 104 or equivalent

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

Terms offered: Fall 2025, Spring 2025, Fall 2024
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

Terms offered: Fall 2025, Spring 2025, Fall 2024
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 153 Molecular Medicine 4 Units

Terms offered: Fall 2025, Fall 2024, Fall 2023
The overarching goal of MCB153 is to convey to students the scientific and regulatory process by which therapeutic drugs are developed and created. After completing this course, students will have a firm understanding on the mechanism of action of several therapies used to fight disease. The course will cover areas such as the discovery and refinement of antibiotics, anti-virals, cancer therapies and CRISPR-based therapies. Furthermore, MCB153 will delve into disease areas not covered in other courses, such as autoimmune diseases, cardiovascular diseases and neurological diseases. Lastly, MCB153 will implement a "case study" for each topic displaying real world challenges and solutions to treating complex diseases.
Rules & Requirements

Prerequisites: BIOLOGY 1A and MCELLBI 102, MCELLBI C100A, or CHEM 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: Dillin, Stanley

MCELLBI 153L Molecular Medicine Laboratory 4 Units

Terms offered: Spring 2025
The lab class seeks to provide students with exposure to basic methodologies for the discovery of novel therapeutics and therapeutic targets. The class will consist of three main modules: Module 1: Phage/ Antibiotics, Module 2: Synthetic lethality and remission in cancer, Module 3: Bioinformatic Analysis. The modules will provide a foundation in cell culture, molecular biology techniques, and computational analysis of data.
Rules & Requirements

Prerequisites: MCELLBI 102 or MCELLBI C100A/CHEM C130

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. Alternative to final exam.

Instructors: Dillin, Cox

MCELLBI 168 Sensory Neuroscience 4 Units

Terms offered: Fall 1995
Sensory cells monitor the environment to trigger behaviors required to feed, avoid danger and thrive. This interactive course combines lectures with instructor-led discussions of research from the scientific literature. Our goals are two fold. First, we will present current concepts in sensory neurobiology by illustrating how different sensory inputs govern homeostasis and behavior. Second, though discussions of scientific data, the course will foster critical thinking skills, and provide practice in drawing logical, evidence-based conclusions.
Rules & Requirements

Prerequisites: MCELLBI 160 or BIOLOGY 1A/1AL-1B, PHYSICS 8A-8B and 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: Lumpkin, Bautista

MCELLBI 170L Molecular and Cell Biology Laboratory 4 Units

Terms offered: Summer 2025 First 6 Week Session, Summer 2024 First 6 Week Session, Summer 2023 First 6 Week Session
This laboratory course for majors in Chemical Biology, Cell Biology, and Biochemistry & Molecular Biology is designed to have students learn the theory and practicality of modern laboratory science. The first and last third of the course will focus on Molecular Biology and Biochemistry where the students will learn basic skills and investigate the role of Kinesin 5 in Mitosis. In the middle Cell Biology portion of the course you will learn about cell structure and the cytoskeleton with an emphasis on microscopy techniques.
Rules & Requirements

Prerequisites: MCELLBI 102, MCELLBI 104, MCELLBI 110 or MCELLBI 140

Credit Restrictions: Students will receive no credit for Molecular and Cell Biology 170L after taking Molecular and Cell Biology 133L, 140L or C110L/Chemistry C110L

Hours & Format

Summer: 6 weeks - 5 hours of lecture and 14 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: Le Blanc

MCELLBI C175 Life Sciences, Business, and Entrepreneurship Capstone Course 4 Units

Terms offered: Prior to 2007
Blended lecture / Project-based course where student teams build out a business plan for a mock biotech company, demonstrating advanced knowledge in therapeutics and business development. Throughout the course student teams will work toward a final project in which they will identify and present a technology overview, disease overview and explanation of unmet need, a development plan, a commercialization plan, risk mitigation strategy, and financials. Class will include field trips, guest lectures, and a pitch competition with prize.
Rules & Requirements

Prerequisites: Students must be in their fourth and final year of the Life Sciences, Business, and Entrepreneurship Program in order to enroll in this class

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

Instructors: Schaletzky, Dillin

Also listed as: UGBA C195C

MCELLBI 180 Undergraduate Teaching of Biology 1A Laboratory 1 or 2 Units

Terms offered: Summer 2025 8 Week Session, Spring 2025, Fall 2024
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 credit up to a total of 4 units.

Hours & Format

Fall and/or spring: 15 weeks - 3-6 hours of session per week

Summer: 8 weeks - 6-12 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

Terms offered: Fall 2012, Fall 2011, Fall 2010
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 credit up to a total of 4 units.

Hours & Format

Fall and/or spring: 15 weeks - 3-6 hours of session per week

Summer:
6 weeks - 7.5-15 hours of session per week
8 weeks - 5.5-11 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 N184 Intro to CRISPR: From Basic Biology to Genome Editing Technology 1 Unit

Terms offered: Summer 2025 3 Week Session, Summer 2024 3 Week Session, Summer 2023 3 Week Session
This 3 week course will address topics in genome editing and CRISPR-Cas9 research, including basic and enhanced CRISPR methods, cellular repair mechanisms, regulation of gene expression, bioinformatics, applications to various organisms, and bioethics. Students will learn from a collection of local experts about ongoing campus research, and gain the background knowledge to understand current publications and applications of genome editing.
Rules & Requirements

Prerequisites: BIOLOGY 1A or equivalent

Hours & Format

Summer: 3 weeks - 4 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.

Instructors: Hockemeyer, Wilson

MCELLBI N184L Intro to CRISPR Lab: From Basic Biology to Genome Editing Technology 1 Unit

Terms offered: Summer 2019 3 Week Session
This 3 week lab course will focus on applications of CRISPR technology as a platform for genome editing and functional genomics. The program will consist of a hands-on laboratory experience demonstrating how CRISPR systems work in situ, as well as use genome editing both in vitro and in vivo. Students will utilize fundamental molecular biology techniques and learn additional protocols specific to genome editing. Two bioinformatics based lessons will cover the essential programs and analyses used in the genome editing field. This course requires concurrent enrollment in a lecture component (MCELLBI N184), where lecturers will address topics in genome editing and CRISPR-Cas9 research.

Rules & Requirements

Prerequisites: Biology 1A/1AL or equivalent course. MCELLBI N184 (may be taken concurrently)

Hours & Format

Summer: 3 weeks - 14 hours of laboratory 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.

Instructors: Hockemeyer, Wilson

MCELLBI 186A Critical Thinking & Scientific Communication in Biomedical Research 2 Units

Terms offered: Fall 2025
This active-learning course is designed for upper division STEM majors pursuing authentic research experiences through a formal research training program at UC Berkeley. Students will develop research and professional skills needed to pursue PhD training in the biosciences, including critical thinking, scientific reasoning and data interpretation, and scientific communication. The course will be structured around scientific presentation formats commonly used at national scientific conferences. Students will learn best-practices for rigor and reproducibility in research, writing meeting abstracts, data display and interpretation, and disseminating research results through talks, posters, and lay summaries.

Rules & Requirements

Prerequisites: BIOLOGY 1A and BIOLOGY 1AL (can be concurrently enrolled); consent of instructor or acceptance in a Biosciences Research Training Program (i.e., MARC or Harris Scholars). MCELLBI 186B can be taken first

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

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: Letter grade. Alternate method of final assessment during regularly scheduled final exam group (e.g., presentation, final project, etc.).

Instructor: Lumpkin

MCELLBI 186B Critical Thinking & Scientific Communication in Biomedical Research 2 Units

Terms offered: Not yet offered
This active-learning course is designed for upper division STEM majors pursuing authentic research experiences through a formal research training program at UC Berkeley. Students will develop research and professional skills needed to pursue PhD training in the biosciences, including critical thinking, scientific reasoning and data interpretation, and scientific communication. The course will be structured around scientific presentation formats commonly used at national scientific conferences. Students will learn best-practices for rigor and reproducibility in research, writing meeting abstracts, data display and interpretation, and disseminating research results through talks, posters, and lay summaries.
Rules & Requirements

Prerequisites: BIOLOGY 1A and BIOLOGY 1AL (can be concurrently enrolled); consent of instructor or acceptance in a Biosciences Research Training Program (i.e., MARC or Harris Scholars). This course may be taken prior to MCELLBI 186A

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

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: Letter grade. Alternate method of final assessment during regularly scheduled final exam group (e.g., presentation, final project, etc.).

Instructor: Lumpkin

MCELLBI 191 Senior Research Thesis 3 Units

Terms offered: Spring 2021, Spring 2020
This course is intended for advanced undergraduates wishing to pursue independent research projects under the mentorship of an Molecular and Cell Biology faculty member. To apply for MCELLBI 191, the research project must be rigorous and provide significant training in biology.
Rules & Requirements

Prerequisites: Consent of instructor and departmental adviser

Credit Restrictions: Students will receive no credit for MCELLBI 191 after completing MCELLBI H196B, or MCELLBI H196A.

Hours & Format

Fall and/or spring: 15 weeks - 9 hours of independent study per week

Summer:
6 weeks - 23 hours of independent study per week
8 weeks - 17 hours of independent study per week
10 weeks - 14 hours of independent study per week
12 weeks - 12 hours of independent study per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Undergraduate

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

MCELLBI 194 Undergraduate Student Instructor for Molecular and Cell Biology Courses 1 - 2 Units

Terms offered: Fall 2018, Fall 2017
UGSIs will work under supervision of instructor and/or GSI. The UGSI will attend three hours of lecture per week where they will assist a GSI in instruction (answering questions, providing demonstrations, facilitating activities, etc.). In addition, UGSIs will meet with students from their section for zero to three hours of tutoring per week depending on the number of units. UGSIs do not evaluate students' work or assign grades. UGSIs will be graded on attendance and preparation of one lesson plan and one quiz. Required to attend any mandatory preparatory and review meetings.
Rules & Requirements

Prerequisites: Must have completed course applying to UGSI with a grade of B or better; or consent of instructor

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

Hours & Format

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

Summer: 8 weeks - 6-6 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. Alternative to final exam.

MCELLBI H196A Honors Research 1 - 4 Units

Terms offered: Fall 2015, Fall 2014, Spring 2014
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 credit up to a total 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

Terms offered: Spring 2020, Spring 2016, Spring 2015
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 credit up to a total 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 0.5 Units

Terms offered: Fall 2016
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 with instructor consent.

Hours & Format

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

Summer: 6 weeks - 8 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

Terms offered: Fall 2025, Spring 2025, Fall 2024
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 without restriction.

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

Terms offered: Fall 2023, Fall 2020, Spring 2020
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 without restriction.

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
12 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.

MCELLBI 200A Fundamentals of Molecular and Cell Biology 3 Units

Terms offered: Fall 2025, Fall 2024, Fall 2023
The goal of this course is to provide graduate-level instruction on molecular and cellular biosciences from a highly-integrated systems perspective, rather than using a more classic, techniques-oriented format. A collection of approaches, and a focus on critical thinking and problem solving, will be used to show how fundamental, highly-significant biological problems are "cracked open." Reading will be assigned from a mix of classic and current peer-reviewed papers selected by the instructors.

Rules & Requirements

Prerequisites: 200A and 200B must be taken concurrently. Combined course required and restricted to all MCB first-year graduate students

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Letter grade.

MCELLBI 200B Fundamentals of Molecular and Cell Biology 3 Units

Terms offered: Fall 2025, Fall 2024, Fall 2023
The goal of this course is to provide graduate-level instruction on molecular and cellular biosciences from a highly-integrated systems perspective, rather than using a more classic, techniques-oriented format. A collection of approaches, and a focus on critical thinking and problem solving, will be used to show how fundamental, highly-significant biological problems are "cracked open." Reading will be assigned from a mix of classic and current peer-reviewed papers selected by the instructors.

Rules & Requirements

Prerequisites: Must be taken concurrently. Combined course required for all MCB first-year graduate students

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Letter grade.

Instructors: Marqusee, Rio, Drubin, Rine, Vance, Feller

MCELLBI 201A CRISPR Gene Editing, Stem Cell and Genomic Analysis 6 Units

Terms offered: Summer 2025 Second 6 Week Session, Summer 2024 Second 6 Week Session
This course seeks to develop students' foundation in critical lab skills and introduce them to the fundamental principles and technologies driving modern biomedical research. After completing MCELLBI 201A, students will have a firm understanding of CRISPR gene editing, cell culture, and genomic analysis. Students will learn the fundamentals of hypothesis-driven research, obtain critical thinking skills for data interpretation, and deliver effective written and oral reports of their results.

Rules & Requirements

Prerequisites: BIOLOGY 1A and MCELLBI 102 or equivalent courses

Credit Restrictions: Students will receive no credit for MCELLBI 201A after completing MCELLBI 201A. A deficient grade in MCELLBI 201A may be removed by taking MCELLBI 201A.

Hours & Format

Summer: 6 weeks - 4 hours of lecture and 18 hours of laboratory per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Letter grade.

Instructors: He, Luo

MCELLBI 201B CRISPR Gene Editing, Stem Cell and Genomic Analysis 4 Units

Terms offered: Fall 2025, Fall 2024
This course seeks to build upon students' foundations set in MCELLBI 201A, in which they were introduced to the fundamental principles and technologies driving modern biomedical research. MCELLBI 201B aims to develop students' skills in bioinformatics and quantitative data analysis. After completing this course, students will understand the RNA-Seq and ChIP-Seq pipelines and carry out their own analyses. Students will continue to learn the fundamentals of experimental design, obtain critical thinking skills for data interpretation, and deliver effective presentations on their results.

Rules & Requirements

Prerequisites: MCELLBI 201A

Credit Restrictions: Students will receive no credit for MCELLBI 201B after completing MCELLBI 201B. A deficient grade in MCELLBI 201B may be removed by taking MCELLBI 201B.

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Letter grade.

Instructor: Ingolia

MCELLBI C205 Modern Optical Microscopy for the Modern Biologist 3 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024, Fall 2023
This course is intended for graduate students in the early stages of their thesis research who are contemplating using modern microscopy tools as part of their work. It endeavors to cut through the confusion of the wide array of new imaging methods, with a practical description of the pros and cons of each. In addition to providing an intuitive physical understanding how these microscopes work, the course will offer hands on experience with cutting-edge microscopes where students will be able to see firsthand how different imaging modalities perform on their own samples, and where they will be able to access computational tools for the visualization and analysis of their data.

Rules & Requirements

Credit Restrictions: Students will receive no credit for MCELLBI 205 after completing MCELLBI 205, or MCELLBI 205. A deficient grade in MCELLBI 205 may be removed by taking MCELLBI 205, or MCELLBI 205.

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Letter grade.

Instructors: Betzig, Ji

Formerly known as: Molecular and Cell Biology 205

Also listed as: NEU C272/PHYSICS C218

MCELLBI 206 Physical Biochemistry 3 Units

Terms offered: Spring 2025, Spring 2024, Spring 2023
Application of modern physical concepts and experimental methods to the analysis of the structure, function, and interaction of large molecules of biological interest.

Rules & Requirements

Prerequisites: MCB C100A or equivalent. Admission to the course requires formal consent of instructors, except for MCB and Biophysics graduate students and graduate students in the laboratories of MCB faculty

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Letter grade.

MCELLBI 210 Advanced Biochemistry and Molecular Biology: Macromolecular Reactions and the Cell 4 Units

Terms offered: Spring 2025, Spring 2024, Spring 2023
General course for first-year graduate students. Covers our current understanding of, methodological approaches for analyzing, and recent advances in the function of cellular macromolecules and macromolecular complexes in DNA replication, recombination, transposition and repair, gene expression and its regulation, mRNA splicing, genome organization, noncoding RNAs, signal transduction, protein synthesis, folding and degradation, growth control, and other life processes.

Rules & Requirements

Prerequisites: 110 or equivalent. Admission to the course requires formal consent of instructors, except for MCB graduate students and graduate students in the laboratories of MCB faculty

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/Graduate

Grading: Letter grade.

Formerly known as: 200

MCELLBI C212A Chemical Biology I - Structure, Synthesis and Function of Biomolecules 1 Unit

Terms offered: Spring 2025, Spring 2024, Spring 2023
This course will present the structure of proteins, nucleic acids, and oligosaccharides from the perspective of organic chemistry. Modern methods for the synthesis and purification of these molecules will also be presented.

Hours & Format

Fall and/or spring: 5 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Letter grade.

Also listed as: CHEM C271A

MCELLBI C212B Chemical Biology II - Enzyme Reaction Mechanisms 1 Unit

Terms offered: Spring 2025, Spring 2024, Spring 2023
This course will focus on the principles of enzyme catalysis. The course will begin with an introduction of the general concepts of enzyme catalysis which will be followed by detailed examples that will examine the chemistry behind the reactions and the three-dimensional structures that carry out the transformations.

Hours & Format

Fall and/or spring: 5 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Letter grade.

Also listed as: CHEM C271B

MCELLBI C212C Chemical Biology III - Contemporary Topics in Chemical Biology 1 Unit

Terms offered: Spring 2025, Spring 2024, Spring 2023
This course will build on the principles discussed in Chemical Biology I and II. The focus will consist of case studies where rigorous chemical approaches have been brought to bear on biological questions. Potential subject areas will include signal transduction, photosynthesis, immunology, virology, and cancer. For each topic, the appropriate bioanalytical techniques will be emphasized.

Hours & Format

Fall and/or spring: 5 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Letter grade.

Also listed as: CHEM C271C

MCELLBI C214 Protein Chemistry, Enzymology, and Bio-organic Chemistry 2 Units

Terms offered: Spring 2020, Spring 2015, Spring 2014, Spring 2013
The topics covered will be chosen from the following: protein structure; protein-protein interactions; enzyme kinetics and mechanism; enzyme design. Intended for graduate students in chemistry, biochemistry, and molecular and cell biology.

Rules & Requirements

Prerequisites: Graduate standing or consent of instructor

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Letter grade.

Also listed as: CHEM C230

MCELLBI C216 Microbial Diversity Workshop 1 Unit

Terms offered: Fall 2025, Fall 2024, Fall 2022
This workshop for graduate students will parallel C116, Microbial Diversity, which should be taken concurrently. Emphasis in the workshop will be on review of research literature and formulation of paper pertinent to research in microbial diversity.

Rules & Requirements

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Letter grade.

Instructor: Coates

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

Also listed as: PLANTBI C216

MCELLBI 218B Research Review in Biochemistry and Molecular Biology: Trace Elements in the Plant Lineage 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Biochemistry of Cu, Fe, Zn and Mn homeostasis and comparative genomics of algae, especially related to photosynthesis and chloroplast biology. Mechanisms of elemental
sparing, including responses to N, S, and P deficiency.

Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Merchant

MCELLBI 218C Research Review in Biochemistry and Molecular Biology: Synthetic Biology and Cellular Enzymology 2 Units

Terms offered: Spring 2025, Spring 2024, Fall 2023
Synthetic biology, metabolic engineering, systems biology, enzyme mechanism, and gene discovery.

Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor or consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Chang

MCELLBI 218F Research Review in Biochemistry and Molecular Biology: Energy-dependent Proteases and Molecular Machines 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Our goals are to decipher the fundamental principles that govern substrate engagement, de-ubiquitylation, unfolding, and translocation by the proteasome.

Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor or consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Martin

MCELLBI 218H Research Review in Biochemistry and Molecular Biology: Protein Synthesis in Bacteria and Mammals 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
The mechanism of protein synthesis in bacteria and human cells. Specific areas of interest include the structure and function of the ribosome and the regulation of protein synthesis.

Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Cate

MCELLBI 218I Research Review in Biochemistry and Molecular Biology: Chemical Biology and Inorganic Chemistry 2 Units

Terms offered: Spring 2025, Spring 2024, Fall 2023
Research and literature topics in chemical biology and inorganic chemistry relevant to human health and disease and energy science will be discussed.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Chris Chang

MCELLBI 218J Research Review in Biochemistry and Molecular Biology: Advanced 20th Century Perspectives on Cancer Cell Genetics 2 Units

Terms offered: Fall 2022, Fall 2021, Spring 2021
Transduction of cellular sequences and genetic regulation of transformation by oncogenic retroviruses as models for natural carcinogenesis, including a critical review of the current research.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Duesberg

MCELLBI 218M Research Review in Molecular Mechanisms of Membrane Transport 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
In our laboratory, we study mechanisms by which molecules are transported across lipid bilayer membranes. Current research efforts to understand mechanisms of protein translocation across intracellular organelles and transport of other biomolecules will be discussed.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Park

MCELLBI 218O Research Review in Biochemistry and Molecular Biology: Chemical Biology and Enzymology 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Topics at the interface of chemistry and biology with a particular focus on mechanisms of enzyme catalysis.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Marletta

MCELLBI 218P Research Review in Biochemistry and Molecular Biology: Chemical Biology and Neuroscience 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Molecular approaches to designing and deploying tools for voltage imaging and brain mapping.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructors: Miller, Evan

MCELLBI 218Q Research Review in Biochemistry and Molecular Biology: Single Molecular Imaging of Macromolecular Enzymes 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Yildiz laboratory combines molecular biology and single molecule biophysical techniques to understand mechanisms that underlie cellular organization and motility. Specific focuses of the lab are to dissect 1) the mechanism of cytoplasmic dynein motility, 2) the regulation of intraflagellar transport, and 3) the protection and maintenance of mammalian telomeres.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Yildiz

MCELLBI 218S Research Review in Biochemistry and Molecular Biology: Cryo-Electron Microscopy of Macromolecules 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Structure-function studies of the cytoskeleton and large molecular machines by cryo-electron microscopy and image reconstruction.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Nogales

MCELLBI 218T Electron Cryo-tomography of Macromolecular Complexes 2 Units

Terms offered: Spring 2023, Fall 2022, Spring 2022
Different methods for determining how the in situ structure and arrangement of macromolecular complexes influence cell morphology and
function will be discussed via literature review and implemented through lab-based research and discussions.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Davies

MCELLBI 218U Research Review in Biochemistry and Molecular Biology: Epigenetic Gene Regulation 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Discussion of recent advances in the mechanism of epigenetic modifications on mammalian gene regulation and developing tools for precision editing of epigenetic modifications for controlling gene expression.

Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Nunez

MCELLBI 218V Research Review in Biochemistry and Molecular Biology: Biophysics of Macromolecule Transport Across Membranes 2 Units

Terms offered: Fall 2014, Spring 2014, Fall 2013
Review of current literature and discussion of original research.

Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Krantz

MCELLBI 218X Research Review in Biochemistry and Molecular Biology: Chemical Reactions of Metabolism 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Define how metabolic reactions function in the context of the cellular system in order to elucidate the so-called design principles of metabolic function.

Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Savage

MCELLBI 219A Structural Membrane Biology 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
The mechanisms by which protein complexes use their structures to bud, bend, and sever membranes will be covered in research reports and reviews of the current literature and in discussion of current experiments in the field.

Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Hurley

MCELLBI 219B Regulation of Translation 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Understanding the molecular basis and physiological role of translational regulation in gene expression with an emphasis on global profiling and functional genomics.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Ingolia

MCELLBI 219H Research Review in Biochemistry and Molecular Biology: Molecular and Cell Biology of Listeria monocytogenes Pathogenesis 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Discussion of recent research on the genetics, cell biology, and immunology of the model facultative intracellular bacterical pathogen,
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Portnoy

MCELLBI 219K Research Review in Chemical Biology, Synthetic Biology, Organic Chemistry and Biophysics 2 Units

Terms offered: Spring 2021, Spring 2002, Fall 2001
Discussion of recent research on chemical biology, synthetic biology, organic chemistry and biophysics.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Schepartz

MCELLBI 219S Research Review in Biochemistry and Molecular Biology: Structural Biology of Signaling and Replication 2 Units

Terms offered: Spring 2024, Fall 2023, Spring 2023
Mechanisms and structure in DNA replication and eukaryotic cell signaling.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Kuriyan

MCELLBI 219U Research Review in Biochemistry and Molecular Biology: Single Molecule Biophysics 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Methods of single molecule manipulation and visualization that are used to characterize the structure and mechanochemical properties of translocating DNA binding protein such as RNA polymerase and to investigate the mechanical denaturation of single protein molecules will be covered in research reports and reviews of the current literature and in discussion of current experiments in the field.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Bustamante

MCELLBI 219Y Research Review in Biochemistry and Molecular Biology: Regulation of HIV Gene Expression 2 Units

Terms offered: Fall 2024, Spring 2024, Fall 2023
Regulation of HIV gene expression by viral proteins and cellular cofactors will be covered in research reports and reviews of the current literature and in discussion of current experiments in the field.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Zhou

MCELLBI 219Z Research Review in Biochemistry and Molecular Biology: Polymerase and RNA Biochemistry and Biology 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Emphasizes eukaryotic retroelement reverse transcriptases and retroelement mobility.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Collins

MCELLBI 220 Therapeutic Modalities 4 Units

Terms offered: Spring 2025, Spring 2024
This class is designed to introduce graduate students to a range of therapeutic modalities that are in development or use. It will focus on small molecules, genomic therapies (including genome editing), and biologics. This class will present different applications of small molecules, RNA or DNA therapeutics, and biologics and discuss both advantages and challenges in their clinical use.
Rules & Requirements

Prerequisites: For MCB students, MCELLBI 200A and MCELLBI 200B are prerequisites for this class. Students outside of MCB should check with the head instructor whether they have the required background to follow this class most productively

Credit Restrictions: Students will receive no credit for MCELLBI 220 after completing MCELLBI 220. A deficient grade in MCELLBI 220 may be removed by taking MCELLBI 220.

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Letter grade.

Instructor: Olzmann

MCELLBI 227 Science Writing and Professional Development 2 Units

Terms offered: Fall 2025, Fall 2024
The overarching goal of this course is to provide students with professional skills in scientific reading, scientific writing, creating a CV or resume and cover letters and understanding the structures of academic institutions and biotech companies. In addition, the class will provide career advice for students entering the academic or biotech work places.
Rules & Requirements

Prerequisites: This course will be limited to students enrolled in the MCB Master of Biotechnology program

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Letter grade.

Instructor: Beatty

MCELLBI 229A Research Review in Viruses as Models for Eukaryote Gene Expression and Replication 2 Units

Terms offered: Fall 2024, Spring 2024, Fall 2023
Recent developments in eukaryote viral and cellular regulation. New concepts in transcription and RNA replication, with particular emphasis on virus-cell interactions.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor or consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Botchan

Formerly known as: Molecular and Cell Biology 218E

MCELLBI 229B Research Review in Molecular Therapeutics: Imaging Single Molecules: Fashion or Game Changer? 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Research review in genetics, genomics and development. We will explore how the detection of single particles
(DNA, RNA, proteins) can help with understanding cellular organization and
enzymatic processes dynamics and kinetics. Most of the experiments described will be drawn from the gene expression and nuclear organization
literature.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Darzacq

Formerly known as: Molecular and Cell Biology 249L

MCELLBI 229C Research Review in Molecular Therapeutics: Structure and Function of RNA 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
RNA structure, folding, and function. Specific topics include ribozyme mechanisms, RNA-mediated translation initiation, and protein targeting and secretion.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Doudna

Formerly known as: Molecular and Cell Biology 219J

MCELLBI 229D Research Review in Molecular Therapeutics: Diseases/Retina 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Evaluation of current research in molecular mechanisms underlying diseases of the retina.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Flannery

Formerly known as: Molecular and Cell Biology 269U

MCELLBI 229E Research Review in Molecular Therapeutics: The Protein Folding Problem 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Protein structure, stability, design, and the pathway of protein folding.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Marqusee

Formerly known as: Molecular and Cell Biology 218R

MCELLBI 229F Research Review in Molecular Therapeutics: Virus-Host Interactions 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Understanding the creative strategies viruses use to manipulate gene expression in host cells, with a focus on RNA-based regulation of gene expression.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Glaunsinger

Formerly known as: Molecular and Cell Biology 219G

MCELLBI 229G Mapping Metabolic Drivers of Disease using Chemoproteomic and Metabolomic Platforms 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
We will discuss current research in the following three areas: 1) mapping metabolic drivers of human diseases using
chemoproteomic and metabolomic platforms; 2) expanding the druggable proteome through mapping and pharmacologically interrogating proteome-wide
hyper-reactive and ligandable hotspots; 3) mapping proteome-wide targets of environmental and pharmaceutical chemicals towards understanding novel
toxicological mechanisms.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Nomura

Formerly known as: Molecular and Cell Biology 218A

MCELLBI 229H Research Review in Molecular Therapeutics: Mechanisms of lipid homeostasis and lipotoxicity 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Discussion of recent literature and original research. Current research examines the cell biology of lipid homeostasis, including the mechanisms that regulate lipid droplet biogenesis, oxidative lipid damage, and ferroptosis.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Olzmann

Formerly known as: Molecular and Cell Biology 239A

MCELLBI 229I Research Review in Molecular Therapeutics: Regulation of the Cell Cycle 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Review of current literature and discussion of original research.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Rape

Formerly known as: Molecular and Cell Biology 239B

MCELLBI 229J Research Review in Understanding and Exploiting Complex Biological Processes and Machines 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Covers aspects of ribosome engineering, organelle imaging and interactions, protein delivery, and cell signaling.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Schepartz

Formerly known as: Molecular and Cell Biology 218N

MCELLBI 229K Research Review in Molecular Therapeutics: Eukaryotic Gene Expression 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Protein-DNA interactions and the control of gene expression in eukaryotes.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Tjian

Formerly known as: Molecular and Cell Biology 219F

MCELLBI 229L Research Review in Molecular Therapeutics: Structure and Function of the Human Epigenome 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Research focuses on (i) understanding the interplay between regulatory information encoded in the primary sequence of the human genome and epigenomic information inscribed by the joint action of trans-acting factors, chromatin remodelers, modifiers, and readers that yields a particular functional state in primary cells of the immune and central nervous systems; (ii) leveraging this understanding to engineer novel architectures for targeted epigenome editors customized for use in these and other clinically relevant human cell types; (iii) establishing preclinical proof-of-concept for the use of the resulting epigenome-editing molecular therapeutics in ex vivo and in vivo models of autoimmune and neurologic disease.

Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Urnov

Formerly known as: Molecular and Cell Biology 249AA

MCELLBI 229M Research Review in Molecular Therapeutics: CRISPR Enzyme Delivery Technology 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
The molecular engineering of novel delivery technology to facilitate therapeutic genome editing. Delivery of pre-formed CRISPR ribonucleoprotein enzymes is a central focus, and progress in the field will be covered via research presentations as well as reviews of recent literature.

Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Wilson

Formerly known as: Molecular and Cell Biology 218G

MCELLBI 229N Research Review in Molecular Therapeutics: Molecular and Cellular Mechanisms of Nutrient Sensing 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
In our laboratory, we study the molecular mechanisms of nutrient sensing and growth control. Specific areas of interest include the mTOR pathway, energy sensing, lysosomal biology and translational control.

Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Zoncu

Formerly known as: Molecular and Cell Biology 218Z

MCELLBI 230 Advanced Cell and Developmental Biology 4 Units

Terms offered: Spring 2025, Spring 2024, Spring 2023
This course will discuss modern concepts of cell and developmental biology, with a strong emphasis on regulatory mechanisms at different length-scales (intermolecular, intracellular and intercellular). It will cover methods of quantitative, single-cell, and organismal biology in cell lines, stem cells, and model organisms. A solid foundation of core cell biology concepts, such as the cell cycle, cytoskeleton, or vesicle transport, is strongly recommended.

Rules & Requirements

Prerequisites: 130. Formal consent of instructors required, except for MCB graduate students and graduate students in the laboratories of MCB faculty

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/Graduate

Grading: Letter grade.

MCELLBI 231 Advanced Developmental and Stem Cell Biology 4 Units

Terms offered: Spring 2018, Spring 2017, Spring 2015
Principles of animal development will be set forth from the classical and recent experimental analysis of induction, localization, patterning mutants, axis formation, regional gene expression, and cell interactions. Early development of selected vertebrates and invertebrates will be examined, and emerging topics in microRNA and stem cell biology will be highlighted. A weekly discussion section with readings from the research literature is required.

Rules & Requirements

Prerequisites: Previous course in development (131 or equivalent) or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1-2 hours of discussion per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Letter grade.

MCELLBI 236 Advanced Mammalian Physiology 5 Units

Terms offered: Fall 2024, Fall 2023, Fall 2022
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 will study advanced physiological topics, including: presentations by the faculty; problem sets; discussion of the primary literature and of reviews; two presentations by each student on topics in current physiological research.

Rules & Requirements

Prerequisites: Consent of instructor

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Letter grade.

MCELLBI 237L Advanced Physical Biology of the Cell 4 Units

Terms offered: Spring 2025, Spring 2024, Spring 2022
Biology is being revolutionized by new experimental techniques that have made it possible to measure the inner workings of molecules, cells and multicellular organisms with unprecedented precision. The objective of this course is to explore this deluge of quantitative data through the use of biological numeracy. We will develop theoretical models that make precise predictions about biological phenomena. These predictions will be tested through the hands-on analysis of experimental data and by performing numerical simulations using Matlab. A laptop is required for this course, but no previous programming experience is required.

Hours & Format

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

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Letter grade.

Instructor: Garcia

MCELLBI C237 Stem Cells and Directed Organogenesis 3 Units

Terms offered: Spring 2015, Spring 2014, Spring 2013
This course will provide an overview of basic and applied embryonic stem cell (ESC) biology. Topics will include early embryonic development, ESC laboratory methods, biomaterials for directed differentiation and other stem cell manipulations, and clinical uses of stem cells.

Rules & Requirements

Prerequisites: Consent of instructor

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Letter grade.

Instructor: Conboy

Also listed as: BIO ENG C218

MCELLBI 238 Stem Cell Research and Gene Therapy: Questions, Solutions and Current Frontiers 1 Unit

Terms offered: Fall 2023, Fall 2022
This lecture series will cover modern approaches to stem cell biology, regenerative medicine and gene therapy. Lectures will include a broad introduction to the day's topic, followed by in depth discussion of one specific recent example- preferably from the speaker's own laboratory- that addresses an imminent question in the field. Relevant research articles will be assigned as background reading. Students are expected to become thoroughly familiar with these materials prior to each class meeting.
Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Hockemeyer

MCELLBI 239BB Research Review in Cell and Developmental Biology: Mechanics and Dynamics of Cell Movements 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Research in our laboratory is focused on the mechanics and dynamics of cell movements on the purified protein, single cell, and tissue levels. For these studies, we are developing new instruments to quantify cell and molecular mechanics bases on optical microscopy, force microscopy, and microfabrication.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Fletcher

MCELLBI 239C The Regulation of Meiotic Gene Expression and Cellular Morphogenesis 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
The mechanisms that link cellular differentiation programs and dynamic gene regulation in complex eukaryotic systems remain mysterious. Such programs drive diverse and central biological processes including organismal development, immune function, disease progression, and meiosis. This course is focused on the molecular basis for the cellular remodeling accompanying meiosis, the highly conserved process by which gametes are produced.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Brar

MCELLBI 239D Research Review in Cell and Developmental Biology: Glial Cell Biology 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Review of relevant literature and discussion of ongoing research: cytoskeletal regulation and mRNA transport in glia; organelle biogenesis and homeostasis, including of Golgi outposts; myelination in learning and behavior; gliovascular development; biophysics of liquid condensates; mechanisms of neurological disease.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Fu

MCELLBI 239EE Research Review in Cell and Developmental Biology: Cell Morphogenesis 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Review of current literature and discussion of original research.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Heald

MCELLBI 239F Research Review in Cell and Developmental Biology: Nucleocytoplasmic Transport 2 Units

Terms offered: Spring 2015, Fall 2014, Spring 2014
Review of current literature and discussion of original research.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Weis

MCELLBI 239FF Research Review in Cell and Developmental Biology: Signal Transduction and Tumor Suppressor Genes 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Review of current literature and discussion of original research.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Luo

MCELLBI 239G Research Review in Cell and Developmental Biology: Mitochondrial biology 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Review of relevant literature and discussion of current research: Mitochondrial dynamics, transport and inheritance; replication, segregation and distribution of mitochondrial genomes; underlying mechanisms of human mitochondrial disease.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Lewis

MCELLBI 239HH Research Review in Cell and Developmental Biology: Mechanisms of Control of Growth and Cell Proliferation 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Identifying pathways that restrict growth and cell proliferation in vivo.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Hariharan

MCELLBI 239I Research Review in Cell and Developmental Biology: Cytoskeleton and Cell Motility 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Review of current literature and discussion of original research.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Welch

MCELLBI 239J Research Review in Cell and Developmental Biology: Steroid Hormone and Growth Factor Action 2 Units

Terms offered: Fall 2023, Spring 2023, Fall 2022
Review of current literature and discussion of original research.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Firestone

MCELLBI 239K Research Review in Cell and Developmental Biology: Secretion and Cell Membrane Assembly 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Cell surface growth with emphasis on the unicellular eukaryote S. cerevisiae.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Schekman

MCELLBI 239KK Research Review in Cell and Developmental Biology: Assembly and Subcellular Organization of Bacterial Organelles 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Review of current literature and discussion of original research.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Komeili

MCELLBI 239M Research Review in Cell and Developmental Biology: MicroRNA Functions in Cancer Development, Mouse Tumor Models 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Malignant transformation represents the endpoint of successive genetic lesions that confer uncontrolled proliferation and survival, unlimited replicative potential, and invasive growth.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: He

MCELLBI 239O Research Review in Cell and Developmental Biology: Cancer Biology 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Inheritance, chromatin structure, gene expression, and the organization of chromosomes in the nucleus.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Karpen

MCELLBI 239P Research Review in Cell and Developmental Biology: Energy Metabolism and Aging 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Review of current literature and discussion of current research. Current research focuses on regulation of energy metabolism and the effect of changes in energy metabolism induced by diet and exercise on age-associated functional decline of organisms.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Titov

MCELLBI 239Q Research Review in Cell and Developmental Biology: Regulation of Cell Polarity in Drosophila 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Mechanisms underlying the establishment and maintenance of cellular organization in epithelia and other cell types.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Bilder

MCELLBI 239R Research Review in Cell and Developmental Biology: Telomere Biology of Human Stem Cells 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
The goal of our laboratory is to understand the key functions of telomeres and telomerase in tissue homeostasis, tumorigenesis, and aging. To this end, we generate genetically engineered human pluripotent and adult stem cell models to measure telomere and telomerase function during cellular differentiation and tumor formation.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Hockemeyer

MCELLBI 239S Research Review in Cell and Developmental Biology: Organ Formation and Function in Zebrafish 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Current research examines the control mechanisms of how cells behave, how cells talk to one another, and how cells sense, change, and maintain their space in the context of organogenesis.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Swinburne

MCELLBI 239T Research Review in Cell and Developmental Biology: The Cell Biology of Fertilization 2 Units

Terms offered: Fall 2023, Spring 2023, Fall 2022
Research in our lab is focused on the cell biology of mammalian fertilization. Our lab uses biophysical, biochemical, and molecular genetics methods to study sperm ion channels and transporters that regulate sperm motility, chemotaxis, and the acrosome reaction. A better understanding of these processes will eventually lead to the development of effective tools to control and preserve male fertility, improve the reproductive health of human population worldwide, and advance family planning.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Lishko

MCELLBI 239U Research Review in Cell and Developmental Biology: The Cytoskeleton and Morphogenesis 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Review of current literature and discussion of current research.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

Fall and/or spring: 15 weeks - 2-0 hours of seminar per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Drubin

MCELLBI 239V Research Review in Cell and Developmental Biology: Molecular Mechanisms of Transduction in Touch and Pain Receptors 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Review of current literature and discussion of current research. Current research focuses on elucidating the molecular mechanisms of somatosensory mechanotransduction.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Bautista

MCELLBI 239W Research Review in Cell and Developmental Biology: Leech Embryology and Development 2 Units

Terms offered: Fall 2023, Spring 2023, Fall 2022
Review of current literature and discussion of original research.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Weisblat

MCELLBI 239Z Research Review in Cell and Developmental Biology: Chromosome Remodeling and Reorganization During Meiosis 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
How chromosomes are reorganized during melosis to accomplish the pairing, recombinatin, and segregation leading up to successful gamete production.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Dernburg

MCELLBI 240 Advanced Genetic Analysis 4 Units

Terms offered: Spring 2025, Spring 2024, Spring 2023
Principles and practice of classical and modern genetic analysis as applied to eukaryotic organisms, including yeast, nematodes, , mice and humans; isolation and analysis of mutations; gene mapping; suppressor analysis; chromosome structure; control of gene expression; and developmental genetics.
Rules & Requirements

Prerequisites: Graduate standing with 110 or 140 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/Graduate

Grading: Letter grade.

Instructors: Koshland, Meyer

MCELLBI C242 CTEG Evolution, Genetics, and Genomics Seminar 1 Unit

Terms offered: Fall 2025, Spring 2025, Fall 2024
This graduate seminar consists of weekly presentations from Berkeley graduate students as well as outside speakers on topics surrounding evolution, genetics, and genomics. Many labs spread across different departments have research programs focused on evolution, genetics, and genomics. However, it can be challenging to keep abreast of this research and to identify potential collaborations due to the dispersion of labs across different departments and specialties. The Center for Theoretical and Evolutionary Genetics (CTEG) is an informal group of labs that collectively work on genetics and genomics. The seminar seeks to provide a common space for graduate students to present their research and learn about the research of their colleagues.
Rules & Requirements

Prerequisites: Graduate standing

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructors: Sudmant, Moorjani

Also listed as: INTEGBI C242

MCELLBI C243 Seq: Methods and Applications 3 Units

Terms offered: Spring 2015, Spring 2014
A graduate seminar class in which a group of students will closely examine recent computational methods in high-throughput sequencing followed by directly examining interesting biological applications thereof.
Rules & Requirements

Prerequisites: Graduate standing in Math, MCB, and Computational Biology; or consent of the instructor

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Letter grade.

Instructor: Pachter

Also listed as: MATH C243

MCELLBI C244 Discrete Mathematics for the Life Sciences 4 Units

Terms offered: Spring 2013
Introduction to algebraic statistics and probability, optimization, phylogenetic combinatorics, graphs and networks, polyhedral and metric geometry.
Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Letter grade.

Also listed as: MATH C239

MCELLBI 249A Research in Genetics and Development: From Sequence to Function in Transcription Factors 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
This course explores experimental and computational approaches to studying the sequence to function relationships of intrinsically disordered proteins. Emphasis on the activation domains of transcription factors. High-throughput experiments, machine learning, evolutionary comparisons, and all atom simulations will be discussed. Additional emphasis will be placed on characterizing the functional consequences of patient mutations in activation domains.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Staller

MCELLBI 249BB Research Review in Genetics and Development: Aging and Protein Homeostasis 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Central to the aging process is the unfolding of the proteome. Specific areas under study include cellular responses to protein misfolding and coordination of these responses across an organism.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Dillin

MCELLBI 249C Research Review in Genetics and Development: Nucleic Acid-Protein Interactions and Control of Gene Expression 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Biochemical and molecular genetic aspects of eukaryotic messenger RNA splicing and transposition, with an emphasis on as an experimental system.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Rio

MCELLBI 249D Research Review in Genetics and Development: Mechanisms of Genetic Regulation in Yeast 2 Units

Terms offered: Fall 2023, Spring 2023, Fall 2022
Genes, gene products and molecular mechanisms that control cell types in the unicellular eukaryote .
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Rine

MCELLBI 249F Research Review in Genetics and Development: Neuronal Development 2 Units

Terms offered: Spring 2025, Fall 2024, Spring 2024
Molecular and genetic approaches to the problem of how neurons develop, with emphasis on and .
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Garriga

MCELLBI 249G Research Review in Genetics and Development: Developmental and Evolutionary Genetics 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
We study how genes control pattern formation during development and pattern modification during evolution.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Miller

MCELLBI 249H Investigating Cellular Aging and Chromosome Segregation during Gametogenesis 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
This course focuses on understanding 1) how cellular aging is affected during gametogenesis, the developmental program that produces gametes for sexual reproduction and 2) how chromosome segregation is regulated during meiosis, the specialized cell division that generates gametes.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Unal

MCELLBI 249HH Research Review in Genetics and Development: Human Population Genetics and Evolutionary Biology 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Research focuses on use of statistical and computational approaches to study questions in human genetics and evolutionary biology. This includes, but is not limited to, studying (1) how different evolutionary processes such as mutation rate evolve across primates, (2) when key events (such as introgression and adaptations) occurred in human history, and (3) how we can leverage large-scale datasets to identify genetic variants related to human adaptation and disease.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Moorjani

MCELLBI 249I Research Review in Genetics and Development: RNA Systems Biology 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
How does the sequence of an RNA determine its post-transcriptional regulation? Genomic and systems biology investigations of alternative splicing, translation, and other post-transcriptional regulatory processes.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Lareau

MCELLBI 249J Research Review in Genetics and Development: Developmental and Molecular Genetics of C. elegans 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Molecular and genetical analysis of sex determination and dosage compensation in the nematode .
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Meyer

MCELLBI 249K Research Review in Genetics and Development: Animal Origins 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Evaluation of current research on choanoflagellates, sponges, and animal origins. Intended to complement ongoing research for graduate students.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: King

MCELLBI 249M Research Review in Genetics and Development: Saccharomyces Cerevisiae Microtubule Cytoskeleton 2 Units

Terms offered: Fall 2023, Spring 2023, Fall 2022
Review of current literature and discussion of current research.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Barnes

MCELLBI 249MM Physical Biology of Living Organisms 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Research review in genetics, genomics and development. In development a single cell goes through a series of repeated divisions and these cells read the program encoded in their DNA in order to become
familiar cell types such as those found in muscle, liver, or our brains. The

goal of our lab is to uncover the rules behind these decisions with the objective of predicting and manipulating developmental programs from just
looking at DNA sequence. In order to reach this predictive understanding we
combine physics, synthetic biology, and new technologies to query and control developmental decisions in real time at the single cell level in the fruit fly embryo.

Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Garcia

MCELLBI 249O Research Review in Genetics and Development: Genome Sequences 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Biochemistry, cancer biology and virology, cell biology, computational biology, genetics, microbiology, molecular and cell physiology.

Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Eisen

MCELLBI 249P Research Review in Genetics and Development: Evolution of Genome Structure and Cellular Diversity 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Review of current literature and discussion of original research in the evolution of genome structure, aging, and cellular and organismal diversity.

Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Sudmant

MCELLBI 249Q Research Review in Genetics and Development: Computational Genomics 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Recent developments in computational methods for genomics and their application for understanding the structure and function of genes encoded in completely sequenced genomes.

Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Brenner

MCELLBI 249R Research Review in Genetics and Development: Vertebrate development and tissue regeneration 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Topics on gene regulatory network control of neural crest cell differentiation during development, vertebrate evolution, and tissue regeneration will be discussed.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Martik

MCELLBI 249T Research Review in Genetics, Genomics and Development: Evolution of Genomes 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Comparative analysis of eukaryotic genomes to inform the origins and diversification of animals and plants.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Rokhsar

MCELLBI 249V Research Review in Genetics and Development: Induction in Vertebrate Development and ES Cell Differentiation 2 Units

Terms offered: Fall 2023, Spring 2023, Fall 2022
The Roelink laboratory is interested in the mechanisms of embryonic induction, the phenomenon in which a group of cells changes the developmental fate of neighboring cells via the release of inducers.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Roelink

MCELLBI 249W Research Review in Genetics and Development: Archaeal Genetics and Methane Metabolism 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Discussions pertaining to the development of new genetic tools for archaeal model organisms with a particular emphasis on methane metabolizing archaea in order to characterize their physiology, evolution and metabolism.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Nayak

MCELLBI 249Y Research Review in Genetics and Development: Mechanisms of Gene Control in Vertebrate Animals 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
This course will focus on mechanisms of gene control in vertebrate animals, particularly in the area of vertebrate development. Amphibian egg formation, mesoderm induction, neural induction, and patterning of the nervous system at the molecular level. Control of transcription, post-transcriptional control of gene expression (including control of RNA turnover and RNA localization).
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Harland

Formerly known as: 218Y

MCELLBI 249Z Research Review in Genetics and Development: Chromosome Structure and Integrity, Genome Evolution 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Use of genetic, cell biological, and biochemical approaches in budding yeast to understand genome integrity, genome evolution, and most recently desiccation tolerance.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Koshland

MCELLBI 250 Advanced Immunology 4 Units

Terms offered: Spring 2025, Spring 2024, Spring 2023
Molecular and cellular analysis of the immune response emphasizing concepts and methodology. Innate immunity, pathogen sensors, antibodies and T cell receptors, lymphocyte activation, tolerance and selection. Antigen processing, T cell subtypes, and T regulatory cells. NK cells, tumor surveillance, and AIDS.
Rules & Requirements

Prerequisites: 100, 110, 140, 150 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/Graduate

Grading: Letter grade.

MCELLBI 251 The Regulation of Immune System Development and Function 1 Unit

Terms offered: Spring 2022, Spring 2021, Fall 2020
This is an advanced seminar course which will consider current research questions and experimental approaches in molecular and cellular immunology. Each registrant will present a 30-minute research talk describing the problems they are studying, the approach they are taking, their preliminary data, and technical problems. Other course participants (including basic immunology faculty) will provide criticism and suggestions.
Rules & Requirements

Prerequisites: 250 or consent of instructor

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Winoto

MCELLBI 259A Mycobacterium Tuberculosis (Mtb) 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
The TB field has entered a new era with the convergence of genetic tools, genome sequencing, bioinformatics, advanced imaging techniques, animal models of infection, and high-throughput assays that allow us to study this multi-faceted interaction between Mtb and its host. We use all of these tools to probe the molecular and cellular events that enable M. tuberculosis to evade host defense mechanisms.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Cox

MCELLBI 259C Research Review in Immunology and Pathogenesis: Nuclear Receptor-Mediated Regulation of Neuroinflammation 2 Units

Terms offered: Fall 2024, Spring 2024, Fall 2023
In this course we will discuss our research as well as recent literatures focusing on understanding of 1) How is homeostasis in the CNS regulated by innate immune functions of microglia? 2) How can we intervene in dysfunction of microglia-mediated immune functions using NRs signaling and transcription?
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Saijo

MCELLBI 259D Research Review in Immunology and Pathogenesis: Mycobacterial Biology and Host-Pathogen Interactions 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
We will discuss macrophage biology and innate immunity in the context of infection with *Mycobacterium tuberculosis* through discussion of current research from the Stanley Lab and both cutting edge and classic literature in relevant fields.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Stanley

MCELLBI 259E Research Review in Immunology and Pathogenesis: Regulation of T Cell Receptor Genes Expression 2 Units

Terms offered: Spring 2024, Fall 2023, Spring 2023
Molecular biology of T cell receptor genes and their transcription controlling proteins/genes. Programmed cell death during thymocyte differentiation.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Winoto

MCELLBI 259F Research Review in Immunology and Pathogenesis: Natural Killer (NK) Cell and T Cell Receptors 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Molecular and biological basis for recognition by natural killer cells and T cells.

Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Raulet

MCELLBI 259G Research Review in Immunology and Pathogenesis: T Cell Development 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Molecular and cellular aspects of thymocyte differentiation.

Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Robey

MCELLBI 259H Research Review in Immunology and Pathogenesis: B Cell Differentiation 2 Units

Terms offered: Fall 2023, Fall 2022, Fall 2021
Molecular basis of terminal B cell differentiation. Role of transcription factors in B cell activation.

Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Sha

MCELLBI 259J Research Review in Immunology and Pathogenesis: Immune Evasion by Viruses 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
The mechanisms used by viruses to counteract the pressure of the immune system.

Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Coscoy

MCELLBI 259K Research Review in Immunology and Pathogenesis: Epigenetic Control for Regulatory T Cell Function in Cancer and Autoimmunity 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Intersecting the fields of cancer biology, immunology, and epigenetics to strengthen our own immune defense mechanisms against our own cancers by reprogramming T cell function specifically within the tumor microenvironment.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Dupage

MCELLBI 259M Research Review in Immunology and Pathogenesis: Innate Immunity and Innate Control of Adaptive Immunity 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Innate immunity and innate control of adaptive immunity.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Barton

MCELLBI 259N Research Review in Immunology and Pathogenesis: Immunology, Microbiology, and Genetics of Bacterial Pathogenesis 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Role of innate host responses in defense against intracellular bacterial pathogens.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Vance

MCELLBI 259O Research Review in Immunology and Pathogenesis: Circadian rhythms in Parasitic Diseases 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
We will discuss circadian rhythms research, at the behavioral, tissue and molecular scales. Our main focus is the circadian regulation of gene expression and its impact in host physiology. We will also focus on malaria and sleeping sickness infections, understanding the clinical aspects, the immune response to parasites and the vector transmission.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Rijo-Ferreira

MCELLBI 259P Research Review in Immunology and Pathogenesis: Cellular barriers to retroviral infection 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Cellular biology and genetics of retroviral infection and cellular antiviral mechanisms. Functional genomics approaches in key host/virus interactions.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: OhAinle

MCELLBI C260 Molecular and Cellular Neurobiology 3 Units

Terms offered: Fall 2025, Fall 2024, Fall 2015
This course covers molecular and cellular aspects of cellular excitability (including membrane potential, action potential generation, spike propagation, and ion channel structure and function), synaptic transmission and plasticity, and sensory systems. Primary reading material will be research papers. We will provide references to textbook chapters for background and review. This will be an interactive course in which you will be expected to be an active participant.
Rules & Requirements

Prerequisites: NEU 100A or equivalent undergraduate-level molecular and cellular neuroscience course

Credit Restrictions: Students will receive no credit for NEU C260 after completing MCELLBI 260, or MCELLBI C261.

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Letter grade.

Formerly known as: Molecular and Cell Biology C260/Neuroscience C260

Also listed as: NEU C260

MCELLBI 269C Research Review in Neurobiology: Molecular Mechanisms of Neuronal Plasticity 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Research in our laboratory focuses on understanding how neurons use biochemical pathways to integrate diverse types of information in order to adjust synaptic strength and modulate neuronal excitability, and how these interactions go awry in disease. To investigate this we are taking a multi-disciplinary approach incorporating molecular, biochemical, imaging, and electrophysiological analyses in mouse and human cells.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Bateup

MCELLBI 269D Research Review in Neurobiology: Signaling Within and Between Neurons 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Review of recent research in molecular mechanisms involved in intracellular and extracellular signaling in the nervous system.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Kramer

MCELLBI 269E Molecular and Biophysical Neuroscience 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Review of research in molecular and biophysical aspects of sensory transduction and electrical signaling in the nervous system.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of the instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Brohawn

MCELLBI 269F Optogenetic Dissection of Neural Circuits 2 Units

Terms offered: Spring 2025, Fall 2024, Spring 2024
Research review in neurobiology. Review of recent optogenetic strategies for dissecting neural connectivity, function, and dysfunction in the rodent and primate brain.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Lammel

MCELLBI 269G Research Review in Development and Application of Advanced Methods for In Vivo Imaging 2 Units

Terms offered: Spring 2025, Fall 2024, Spring 2024
Development and application of optical imaging methods for clearer, deeper, and faster imaging of biological tissue in vivo, including a critical review of the current research.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Ji

MCELLBI 269I Research Review in Neurobiology: Stem Cells and Gene Therapy in the Nervous System 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
The basic investigation of neural differentiation of stem cells, as well as the
use of stem cells and gene delivery for neuroregeneration.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Schaffer

MCELLBI 269J Research Review in Neurobiology: Taste Recognition in Drosophila 2 Units

Terms offered: Fall 2023, Spring 2023, Fall 2022
The molecular and cellular basis of taste perception in the model organism .

Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Scott

MCELLBI 269K Research Review in Neurobiology: Instructive Cues for Neural Form and Function 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Molecular and circuit studies of the mechanisms that specify synaptic properties and how these properties bias the timescales of neuronal computation.

Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Gomez

MCELLBI 269M Research Review in Neurobiology: Insect Neurophysiology 2 Units

Terms offered: Fall 2024, Spring 2024, Fall 2023
Drosophila mutants that have behavioral abnormalities to unravel new and basic features of nervous system structure and function.

Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Tanouye

MCELLBI 269N Research Review in Neurobiology: Synaptic and Circuit Mechanisms that Support Spatial Navigation 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Research in the Fisher laboratory focuses on spatial navigation in fruit flies in order to understand how nervous systems flexibly process information. Our research combines in vivo electrophysiology, 2-photon imaging, advanced genetic approaches and quantitative behavioral analysis to understand how the fly’s brain constructs and maintains a sense of direction under ever-changing conditions.

Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Fisher

MCELLBI 269O Research Review in Neurobiology: Neural Circuits for Sensory Processing and Behavior 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Microcircuitry of the cerebral cortex that underlies sensory processing and adaptive behavior.

Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Adesnik

MCELLBI 269P Research Review in Neurobiology: Visual Neuroscience 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Mechanisms for visual object representation including recognition, memory, segmentation, tracking, 3D representation, and embedding into meaningful scenes. Understanding the function of feedforward and feedback pathways in vision.

Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Tsao

MCELLBI 269Q Research Review in Neurobiology: Sensory Processing and Plasticity in Cerebral Cortex 2 Units

Terms offered: Spring 2025, Fall 2024, Spring 2024
How the cerebral cortex processes sensory input and stores information about the sensory world. We focus on the rat's primary somatosensory (S1) cortex.

Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Feldman

MCELLBI 269R Research Review in Neurobiology: Potassium Channels and Synaptic Plasticity 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Review of current literature and discussion of original research.

Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Isacoff

MCELLBI 269T Research Review in Neurobiology: Processing of Visual Information in the Mammalian Brain 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Review of current literature and discussion of original research.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Dan

MCELLBI 269W Research Review in Neurobiology: Neural Activity Affecting the Assembly of Neural Circuits 2 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
How neural activity affects the assembly of neural circuits.
Rules & Requirements

Prerequisites: Enrollment is restricted to students conducting research in the laboratory of the instructor, or requires consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Feller

MCELLBI 275 Therapeutics Development in Biotech: Financing, Regulation and Social Ethics 2 Units

Terms offered: Fall 2025, Fall 2024
This course offers an introduction to the field of biotechnology and will cover the history of the field, its impact on medicine and society, key methodologies, important therapeutic areas, and the range of career options available in the biopharmaceutical industry. Students will hear from lecturers with expertise ranging from molecular biology to clinical trial design and interpretation and be given an integrated overview of a complex area. Students will actively participate in experiential learning about relevant topics and presenting their findings in class, which will deepen understanding. There will be interactive elements, using a Socratic discussion format. Students are expected to participate actively.
Rules & Requirements

Prerequisites: Students must be enrolled in the Master of Biotechnology program

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Letter grade.

Instructor: Schaletzky

MCELLBI 276 Sample Management, Drug Discovery and Lab Automation 3 Units

Terms offered: Spring 2025
Automation plays an increasing role in academic and biotech labs. High-Throughput Screening (HTS) leverages screening of large libraries for activity against biological targets for drug discovery, enabled by automation, miniaturized assays and large-scale data analysis. Students learn process automation and hands-on training on sample management and liquid handling robotics. Students conduct a primary screen and follow up hits through dose response, using LIMS/Sample Management/ Sample Tracking/Equipment Validation/QC and data analysis and interpretation. Students will understand what is required to run a HTS experiment, use robotics, data processing and control software, and learn how automation can help with accuracy and precision.
Rules & Requirements

Prerequisites: This course will be limited to students enrolled in the MCB Master of Biotechnology program

Hours & Format

Fall and/or spring: 11 weeks - 2 hours of lecture and 4 hours of laboratory per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Letter grade.

MCELLBI C277 Communicating Quantitative Information 2 Units

Terms offered: Fall 2021, Spring 2020, Spring 2019
This course will cover several aspects of communicating quantitative information, with a primary focus on visualizations for publications, presentations, and posters. Other topics include sharing of data and analyses, such as new publication models and interactive notebooks, as well as lifecycle data management and publication. Primary discussion will be on conceptual issues, and students will be expected to use various systems and resources as self-directed homestudy.

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Letter grade.

Instructor: Brenner

Also listed as: PLANTBI C277

MCELLBI 279 Master of Biotechnology Internship 4 - 8 Units

Terms offered: Spring 2025
This course synthesizes conceptual and technical knowledge students gained throughout the Master of Biotechnology program, challenging them to tackle an internship project under the supervision of their internship mentor and instructor. Abstract concepts are grounded in real-world problems that students address as part of their internship. MCB279 develops students' advanced research skills. They work with their mentor and the instructor to identify a question to address, devise a plan to interrogate it, and successfully execute their plan. The internship trains students to work collaboratively with others towards a shared mission and to think critically and creatively to apply their training to meet the needs of their host company or lab.

Rules & Requirements

Prerequisites: Students must be enrolled in the Master of Biotechnology program

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

Hours & Format

Fall and/or spring: 15 weeks - 12-24 hours of internship per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Letter grade.

MCELLBI 280A Selected Topics in Molecular and Cell Biology 1 Unit

Terms offered: Spring 2022, Spring 2012, Spring 2011
The course will focus on fundamental principles, essential concepts, and recent advances in select topics in molecular and cell biology. Topics include genomics and computational biology, molecular evolution, neurons and synapses, microbi ology and immunology, macromolecular structure and function, and scientific writing. Courses are taught in tandem and maybe taken individually.

Rules & Requirements

Prerequisites: Graduate standing or consent of instructor

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

Hours & Format

Fall and/or spring: 5 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Letter grade.

MCELLBI 280B Selected Topics in Molecular and Cell Biology 1 Unit

Terms offered: Spring 2012, Spring 2011, Spring 2010
The course will focus on fundamental principles, essential concepts, and recent advances in select topics in molecular and cell biology. Topics include genomics and computational biology, molecular evolution, neurons and synapses, microbi ology and immunology, macromolecular structure and function, and scientific writing. Courses are taught in tandem and maybe taken individually.

Rules & Requirements

Prerequisites: Graduate standing and consent of instructor

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

Hours & Format

Fall and/or spring: 5 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Letter grade.

MCELLBI 280C Selected Topics in Molecular and Cell Biology 1 Unit

Terms offered: Spring 2022, Spring 2021, Spring 2016
The course will focus on fundamental principles, essential concepts, and recent advances in select topics in molecular and cell biology. Topics include genomics and computational biology, molecular evolution, neurons and synapses, microbi ology and immunology, macromolecular structure and function, and scientific writing. Courses are taught in tandem and maybe taken individually.

Rules & Requirements

Prerequisites: Graduate standing and consent of instructor

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

Hours & Format

Fall and/or spring: 5 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Letter grade.

MCELLBI 280D Selected Topics in Molecular and Cell Biology 1 Unit

Terms offered: Fall 2025, Fall 2024, Fall 2023
The course will focus on fundamental principles, essential concepts, and recent advances in select topics in molecular and cell biology. Topics include genomics and computational biology, molecular evolution, neurons and synapses, microbi ology and immunology, macromolecular structure and function, and scientific writing. Courses are taught in tandem and maybe taken individually.

Rules & Requirements

Prerequisites: Graduate standing or consent of instructor

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

Hours & Format

Fall and/or spring: 5 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Letter grade.

MCELLBI 280E Selected Topics in Molecular and Cell Biology 1 Unit

Terms offered: Spring 2012, Spring 2011, Spring 2010
The course will focus on fundamental principles, essential concepts, and recent advances in select topics in molecular and cell biology. Topics include genomics and computational biology, molecular evolution, neurons and synapses, microbi ology and immunology, macromolecular structure and function, and scientific writing. Courses are taught in tandem and maybe taken individually.

Rules & Requirements

Prerequisites: Graduate standing and consent of instructor

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

Hours & Format

Fall and/or spring: 5 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Letter grade.

MCELLBI 280F Selected Topics in Molecular and Cell Biology 1 Unit

Terms offered: Fall 2016, Spring 2012, Spring 2011
The course will focus on fundamental principles, essential concepts, and recent advances in select topics in molecular and cell biology. Topics include genomics and computational biology, molecular evolution, neurons and synapses, microbi ology and immunology, macromolecular structure and function, and scientific writing. Courses are taught in tandem and maybe taken individually.

Rules & Requirements

Prerequisites: Graduate standing and consent of instructor

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

Hours & Format

Fall and/or spring: 5 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Letter grade.

MCELLBI 288 Data Science for Molecular and Cell Biology 3 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020
Data science is rapidly becoming a critical skill for molecular and cell biologists. This course provides a survey of data science concepts and methods, including practical statistical inference and modeling, data visualization and exploration, elementary machine learning, and simulation. The course is practically oriented. Diverse real-world datasets, along with simulated data, will be used to develop skills and intuition.
Rules & Requirements

Prerequisites: Graduate standing in the biological sciences or permission from instructors. Prior introductory exposure to programming is desired, e.g., through Data Science 8, MCB Python “boot camp,” or self taught from introductory programming tutorials. Please see http://python.berkeley.edu/resources/ for suggested resources. No prior statistics is assumed. The course is not suitable for students with advanced training in statistics or machine learning

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructors: Rokhsar, Eisen

MCELLBI 289 Master of Biotechnology Capstone Course 5 Units

Terms offered: Spring 2025
This capstone course fosters collaborative learning by bringing together students each week to discuss their internship project that they have been working on individually or in small groups under the supervision of their internship mentor. Students are encouraged to apply critical thinking skills to evaluate other projects and to provide constructive feedback. Students will work towards a final written report and oral presentation. They will identify and present a technology overview, explanation of unmet need, a central working hypothesis, a plan to test said hypothesis, execution of their plan, and a final research product. The final presentation will be in a poster presentation format.
Rules & Requirements

Prerequisites: MCELLBI 201A and MCELLBI 201B. Students must be enrolled in the Master of Biotechnology program

Hours & Format

Fall and/or spring: 15 weeks - 5 hours of seminar per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Letter grade.

Instructor: Luo

MCELLBI 290 Graduate Seminar 1 Unit

Terms offered: Fall 2025, Spring 2025, Fall 2024
Graduate student presentations on selected research topics in molecular and cell biology. Several sections covering different topics offered each semester. Concurrent enrollment in more than one section is permitted. List of topics to be announced before each semester.
Rules & Requirements

Prerequisites: Graduate standing in the department or consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Letter grade.

MCELLBI 291A Introduction to Research 2 - 12 Units

Terms offered: Fall 2025, Fall 2024, Fall 2023
Closely supervised experimental work under the direction of an individual faculty member; an introduction to experimental methods and research approaches in particular areas of molecular and cell biology.
Rules & Requirements

Prerequisites: Consent of instructor

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

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

MCELLBI 291B Introduction to Research 2 - 12 Units

Terms offered: Spring 2025, Spring 2024, Spring 2023
Closely supervised experimental work under the direction of an individual faculty member; an introduction to experimental methods and research approaches in particular areas of molecular and cell biology.
Rules & Requirements

Prerequisites: Consent of instructor

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

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

MCELLBI 292 Research 3 - 12 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Individual research under the supervision of a faculty member.
Rules & Requirements

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Letter grade.

MCELLBI N292 Research 3 - 6 Units

Terms offered: Summer 2009 10 Week Session, Summer 2008 10 Week Session, Summer 2006 10 Week Session
Individual research under the supervision of a staff member.
Rules & Requirements

Prerequisites: Consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Letter grade.

MCELLBI 293A Research Seminar 2 Units

Terms offered: Fall 2025, Fall 2024, Fall 2023
Seminar on presentation and evaluation of results in area of student's individual research interests.
Rules & Requirements

Prerequisites: Concurrent enrollment in 291A or 292

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

MCELLBI 293C Responsible Conduct in Research 1 Unit

Terms offered: Spring 2025, Spring 2024, Fall 2023
The purpose of this course is to ensure that research trainees receive ample training in Responsible Conduct in Research. Students also gain an understanding of federal, state, and UC Berkeley policies and resources available to further support their research endeavors.
Rules & Requirements

Prerequisites: Consent of instructor

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Sharma

MCELLBI 293D Rigor and Reproducibility in Research 1 Unit

Terms offered: Prior to 2007
The purpose of this course is to ensure that research trainees receive training in Rigor and Reproducibility in Research. Students also gain an understanding of federal, state, and UC Berkeley policies and resources available to further support their research endeavors.
Rules & Requirements

Prerequisites: Consent of Instructor

Hours & Format

Fall and/or spring: 15 weeks - 1.5 hours of lecture per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Sharma

MCELLBI 293R Responsible Conduct of Research Refresher 1 Unit

Terms offered: Prior to 2007

This refresher course will cover topics in responsible conduct in research drawing from case studies of the Association of American Medical Colleges and the NIH. Students will review case studies in preparation for class discussion. Required of all 4th year MCB graduate students funded on NIH training grants.

Objectives & Outcomes

Course Objectives: Collaborative research including collaborations with industry
Data acquisition and laboratory tools; management, sharing and ownership
Mentor/mentee responsibilities and relationships
Policies regarding human subjects, live vertebrate animal subjects in research, and safe laboratory
practices
Research misconduct and policies for handling misconduct
Responsible authorship and publication
The scientist as a responsible member of society, contemporary ethical issues in biomedical research, and
the environmental and societal impacts of scientific research

Rules & Requirements

Prerequisites: Consent of instructor. Must be a 4th year MCB graduate student

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Sharma

MCELLBI 293S Foundations of Biostatistical Practice 1 Unit

Terms offered: Fall 2018, Spring 2018

This course is designed to introduce students to the foundations of statistics in the context of biological research. Rather than focusing on a catalog of specific methods (by essence non-exhaustive and rapidly outdated), the course emphasizes general concepts and approaches necessary for sound statistical practice. Topics covered include: exploratory data analysis (EDA); data visualization; inferential reasoning; models and assumptions; statistical computing; computationally reproducible research. The statistical methods and software are motivated by and illustrated on data structures that arise in current biological and medical research.

Rules & Requirements

Prerequisites: Consent of instructor

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

MCELLBI 294 Current Topics in Biomedical Sciences 1 Unit

Terms offered: Fall 2025, Fall 2022, Fall 2021

This course will discuss cutting-edge topics in biochemistry, structural biology, cell biology, developmental biology and genetics. Lectures will be given by internationally recognized biomedical scientists that visit the Molecular and Cell Biology Department and present work currently performed in their laboratories. The class will include topics ranging from structural analysis of important signaling molecules, live cell imaging and high resolution microscopy of critical cellular structures, to genetic dissection of essential signaling networks in cells and developmental pathways in multicellular organisms. It is the goal of this class to expose students to both the breadth and highest standards of current biomedical research.

Rules & Requirements

Prerequisites: Molecular and Cell Biology graduate students only

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

MCELLBI 295 Careers for Life Sciences Ph.D's 1 Unit

Terms offered: Spring 2025, Spring 2024, Spring 2023
This course is designed to assist graduate students in the biological sciences with planning their postgraduate careers. Weekly guest speakers will present their experiences on a variety of topics. Postdoctoral students are invited. Topics may include academia; job searches; setting up a laboratory; patent law/technology transfer; public policy/regulatory affairs; bioinformatics; science writing/technical support; forensic science; postdoctoral positions in industry; teaching, and other topics of interest.

Rules & Requirements

Prerequisites: Open to graduate and postdoctoral students

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

MCELLBI 296 Molecular and Cell Biology Colloquium 0.0 Units

Terms offered: Spring 2020, Spring 2019, Spring 2018
Meetings for the presentation of original work by faculty, visiting lecturers, and graduate students.

Hours & Format

Fall and/or spring: 15 weeks - 1.5 hours of colloquium per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

MCELLBI C296 Doctoral Seminar in Computational Biology 2 Units

Terms offered: Spring 2024, Fall 2022, Fall 2021
This interactive seminar builds skills, knowledge and community in computational biology for first year PhD and second year Designated Emphasis students. Topics covered include concepts in human genetics/genomics, microbiome data analysis, laboratory methodologies and data sources for computational biology, workshops/instruction on use of various bioinformatics tools, critical review of current research studies and computational methods, preparation for success in the PhD program and career development. Faculty members of the graduate program in computational biology and scientists from other institutions will participate. Topics will vary each semester.

Rules & Requirements

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

Hours & Format

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate

Grading: Letter grade.

Instructors: Moorjani, Rokhsar

Also listed as: CMPBIO C293

MCELLBI 375 Pedagogy for MCB Graduate Student Instructors 2 Units

Terms offered: Prior to 2007
This course introduces new graduate student instructors to effective teaching methods that they can use in their MCB courses. Through readings, discussions and demonstrations, students will learn how to engage and motivate students, facilitate active participation, plan a class period, and write exam or practice problems. Emphasis will be placed on science education literature and proven practical techniques. We will also provide support and solutions for dealing with difficult situations that may come up during the semester.

Rules & Requirements

Prerequisites: Appointment as graduate student instructor or consent of instructor

Hours & Format

Fall and/or spring: 10 weeks - 1 hour of seminar per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Professional course for teachers or prospective teachers

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructors: Ball, Beatty, Barnes

MCELLBI 380 Teaching of Molecular and Cell Biology 1 - 2 Units

Terms offered: Fall 2022, Spring 2016, Fall 2015
Teaching laboratories and/or discussions for Molecular and Cell Biology courses: analysis of specific format and problems. Two units of credit for those with 50% teaching appointment; one unit of credit for those with 25% teaching appointment.
Rules & Requirements

Prerequisites: Appointment as graduate student instructor or consent of instructor

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

Hours & Format

Fall and/or spring: 15 weeks - 0-1 hours of seminar per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Professional course for teachers or prospective teachers

Grading: Offered for satisfactory/unsatisfactory grade only.

MCELLBI 481B Instrumentation in Molecular and Cell Biology: Transmission Electron Microscopy 1 - 4 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Individualized laboratory instruction.
Rules & Requirements

Prerequisites: Graduate standing; consent of instructor and sponsorship of a faculty member

Hours & Format

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

Summer:
6 weeks - 2.5-10 hours of independent study per week
8 weeks - 2-7.5 hours of independent study per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Other professional

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructors: Dernburg, Karpen

MCELLBI 481C Instrumentation in Molecular and Cell Biology: Scanning Electron Microscopy 1 - 4 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Individualized laboratory instruction.
Rules & Requirements

Prerequisites: Graduate standing; consent of instructor and sponsorship of a faculty member

Hours & Format

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

Summer:
6 weeks - 2.5-10 hours of independent study per week
8 weeks - 2-7.5 hours of independent study per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Other professional

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructors: Dernburg, Karpen

MCELLBI 601 Individual Study for Master's Students 1 - 8 Units

Terms offered: Fall 2006, Spring 2005, Spring 2001
Individual study for the comprehensive or language examinations in consultation with the field adviser.
Rules & Requirements

Credit Restrictions: Course does not satisfy unit or residence requirements for master's degree.

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

Hours & Format

Fall and/or spring: 15 weeks - 1-8 hours of independent study per week

Summer: 8 weeks - 1.5-15 hours of independent study per week

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate examination preparation

Grading: Offered for satisfactory/unsatisfactory grade only.

MCELLBI 602 Individual Study for Doctoral Students 1 - 8 Units

Terms offered: Spring 2006, Spring 2005, Fall 2004
Individual study in consultation with the major field adviser. Intended to provide an opportunity for qualified students to prepare themselves for the various examinations required of candidates for the Ph.D.

Rules & Requirements

Prerequisites: Restricted to Ph.D. candidates

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

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

Hours & Format

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

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

Additional Details

Subject/Course Level: Molecular and Cell Biology/Graduate examination preparation

Grading: Offered for satisfactory/unsatisfactory grade only.