Molecular and Cell Biology

The Department of Molecular and Cell Biology offers a program of graduate study leading to the PhD in molecular and cell biology. This program provides advanced training in the research methods and concepts of the study of the molecular structures and processes of cellular life. The training is intellectually focused, but at the same time offers an unusually wide range of opportunities for varied disciplinary specialization.

The teaching and research activities of the Department of Molecular and Cell Biology (MCB) concern the molecular structures and processes of cellular life and their roles in the function, reproduction, and development of living organisms. This agenda covers a broad range of specialized disciplines, including biochemistry, biophysics, molecular biology, structural biology, genetics, genomics, bioinformatics, cell biology, developmental biology, tumor biology, microbiology, immunology, pathogenesis, and neurobiology.

The types of living organisms from which the departmental faculty draws its working materials are as diverse as its disciplinary specializations, ranging from viruses and microbes through plants, roundworms, annelids, arthropods, and mollusks to fish, amphibia, and mammals.

The faculty is organized into five divisions: Biochemistry, Biophysics, and Structural Biology; Cell and Developmental Biology; Genetics, Genomics and Development; Immunology and Pathogenesis and Neurobiology.

Admission to the University

*GRE score submission is not required for application to the MCB program.

Minimum Requirements for Admission

The following minimum requirements apply to all graduate programs and will be verified by the Graduate Division:

1. A bachelor’s degree or recognized equivalent from an accredited institution;
2. A grade point average of B or better (3.0);
3. If the applicant has completed a basic degree from a country or political entity (e.g., Quebec) where English is not the official language, adequate proficiency in English to do graduate work, as evidenced by a TOEFL score of at least 90 on the iBT test, 570 on the paper-and-pencil test, or an IELTS Band score of at least 7 on a 9-point scale (note that individual programs may set higher levels for any of these); and
4. Sufficient undergraduate training to do graduate work in the given field.

Applicants Who Already Hold a Graduate Degree

The Graduate Council views academic degrees not as vocational training certificates, but as evidence of broad training in research methods, independent study, and articulation of learning. Therefore, applicants who already have academic graduate degrees should be able to pursue new subject matter at an advanced level without the need to enroll in a related or similar graduate program.

Programs may consider students for an additional academic master’s or professional master’s degree only if the additional degree is in a distinctly different field.

Applicants admitted to a doctoral program that requires a master’s degree to be earned at Berkeley as a prerequisite (even though the applicant already has a master’s degree from another institution in the same or a closely allied field of study) will be permitted to undertake the second master’s degree, despite the overlap in field.

The Graduate Division will admit students for a second doctoral degree only if they meet the following guidelines:

1. Applicants with doctoral degrees may be admitted for an additional doctoral degree only if that degree program is in a general area of knowledge distinctly different from the field in which they earned their original degree. For example, a physics PhD could be admitted to a doctoral degree program in music or history; however, a student with a doctoral degree in mathematics would not be permitted to add a PhD in statistics.
2. Applicants who hold the PhD degree may be admitted to a professional doctorate or professional master’s degree program if there is no duplication of training involved.

Applicants may apply only to one single degree program or one concurrent degree program per admission cycle.

Required Documents for Applications

1. Transcripts: Applicants may upload unofficial transcripts with your application for the departmental initial review. If the applicant is admitted, then official transcripts of all college-level work will be required. Official transcripts must be in sealed envelopes as issued by the school(s) attended. If you have attended Berkeley, upload your unofficial transcript with your application for the departmental initial review. If you are admitted, an official transcript with evidence of degree conferral will not be required.
2. Letters of recommendation: Applicants may request online letters of recommendation through the online application system. Hard copies of recommendation letters must be sent directly to the program, not the Graduate Division.
3. Evidence of English language proficiency: All applicants who have completed a basic degree from a country or political entity in which the official language is not English are required to submit official evidence of English language proficiency. This applies to institutions from Bangladesh, Burma, Nepal, India, Pakistan, Latin America, the Middle East, the People’s Republic of China, Taiwan, Japan, Korea, Southeast Asia, most European countries, and Quebec (Canada). However, applicants who, at the time of application, have already completed at least one year of full-time academic course work with grades of B or better at a US university may submit an official transcript from the US university to fulfill this requirement. The following courses will not fulfill this requirement:
   - courses in English as a Second Language,
   - courses conducted in a language other than English,
   - courses that will be completed after the application is submitted, and
   - courses of a non-academic nature.
If applicants have previously been denied admission to Berkeley on the basis of their English language proficiency, they must submit new test scores that meet the current minimum from one of the standardized tests. Official TOEFL score reports must be sent directly from Educational Test Services (ETS). The institution code for Berkeley is 4833. Official IELTS score reports must be sent electronically from the testing center to University of California, Berkeley, Graduate Division, Sproul Hall, Rm 318 MC 5900, Berkeley, CA 94720. TOEFL and IELTS score reports are only valid for two years.

Where to Apply
Visit the Berkeley Graduate Division application page (http://grad.berkeley.edu/admissions/apply/).

Normative Time Requirements
- Normative time to advancement is 2 years
- Normative time in candidacy is 3.5 years
- Total normative time is 5.5 years

Course Requirement by Year in Program
- 1st Year
  - MCB 200A
  - MCB 200B
  - MCB 291 A
  - MCB 291 B
  - MCB 293A
  - MCB 293C
  - Two advanced topics courses
- 2nd Year
  - MCB 375
  - MCB 292
- 3rd Year
  - MCB 380
  - MCB 292
  - MCB 290
- 4th Year and Beyond
  - MCB 292
  - MCB 290

Other Requirements
- 1st-author or co-1st-author publication
- Individual Development Plan (IDP) in 1st, 3rd, and 5th years
- Annual thesis committee meetings after advancement to candidacy (3rd year and beyond)

Curriculum

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<td>MCELLBI 200A</td>
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<td>MCELLBI 291A</td>
<td>Introduction to Research</td>
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<tr>
<td>MCELLBI 293R</td>
<td>Responsible Conduct of Research Refresher</td>
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<tr>
<td>MCELLBI 375</td>
<td>Pedagogy for MCB Graduate Student Instructors</td>
<td>2</td>
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</tbody>
</table>
MCELLBI 200B Fundamentals of Molecular and Cell Biology 3 Units
Terms offered: Fall 2021, Fall 2020, Fall 2019
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.
Prerequisites: Must be taken concurrently. Combined course required for all MCB first-year graduate students

MCELLBI C205 Modern Optical Microscopy for the Modern Biologist 3 Units
Terms offered: Spring 2022, Spring 2021
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.

MCELLBI 206 Physical Biochemistry 3 Units
Terms offered: Spring 2022, Spring 2021, Spring 2020
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

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.

Additional Details
Subject/Course Level: Molecular and Cell Biology/Graduate
Grading: Letter grade.
Instructors: Marqusee, Rio, Drubin, Rine, Vance, Feller

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: PHYSICS C218

Additional Details
Subject/Course Level: Molecular and Cell Biology/Graduate
Grading: Letter grade.
Instructors: Marqusee, Rio, Drubin, Rine, Vance, Feller

Physical Biochemistry: Read Less [-]
MCELLBI 210 Advanced Biochemistry and Molecular Biology: Macromolecular Reactions and the Cell 4 Units
Terms offered: Spring 2022, Spring 2021, Spring 2020
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

Advanced Biochemistry and Molecular Biology: Macromolecular Reactions and the Cell: Read More [+]

MCELLBI C212A Chemical Biology I - Structure, Synthesis and Function of Biomolecules 1 Unit
Terms offered: Spring 2022, Spring 2021, Spring 2020
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.

Chemical Biology I - Structure, Synthesis and Function of Biomolecules: Read More [+]

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

Chemical Biology I - Structure, Synthesis and Function of Biomolecules: Read Less [-]

MCELLBI C212B Chemical Biology II - Enzyme Reaction Mechanisms 1 Unit
Terms offered: Spring 2022, Spring 2021, Spring 2020
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.

Chemical Biology II - Enzyme Reaction Mechanisms: Read More [+]

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

Chemical Biology II - Enzyme Reaction Mechanisms: Read Less [-]

MCELLBI C212C Chemical Biology III - Contemporary Topics in Chemical Biology 1 Unit
Terms offered: Spring 2022, Spring 2021, Spring 2020
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.

Chemical Biology III - Contemporary Topics in Chemical Biology: Read More [+]

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

Chemical Biology III - Contemporary Topics in Chemical Biology: Read Less [-]
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.
Protein Chemistry, Enzymology, and Bio-organic Chemistry: Read More [+]

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
Protein Chemistry, Enzymology, and Bio-organic Chemistry: Read Less [-]

MCELLBI C216 Microbial Diversity Workshop 1 Unit
Terms offered: Fall 2021, Fall 2020, Fall 2019
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.
Microbial Diversity Workshop: Read More [+]

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: Offered for satisfactory/unsatisfactory grade only.
Instructor: Nomura
Formerly known as: Molecular and Cell Biology C216, Plant and Microbial Biology C216
Also listed as: PLANTBI C216
Microbial Diversity Workshop: Read Less [-]

MCELLBI 218A Mapping Metabolic Drivers of Disease using Chemoproteomic and Metabolomic Platforms 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
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.
Mapping Metabolic Drivers of Disease using Chemoproteomic and Metabolomic Platforms: Read More [+]

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
Mapping Metabolic Drivers of Disease using Chemoproteomic and Metabolomic Platforms: Read Less [-]
MCELLBI 218B Research Review in Biochemistry and Molecular Biology: Trace Elements in the Plant Lineage 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Research Review in Biochemistry and Molecular Biology: Trace Elements in the Plant Lineage: Read More [+]

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

Research Review in Biochemistry and Molecular Biology: Trace Elements in the Plant Lineage: Read Less [-]

MCELLBI 218C Research Review in Biochemistry and Molecular Biology: Synthetic Biology and Cellular Enzymology 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Synthetic biology, metabolic engineering, systems biology, enzyme mechanism, and gene discovery.
Research Review in Biochemistry and Molecular Biology: Synthetic Biology and Cellular Enzymology: Read More [+]

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

Research Review in Biochemistry and Molecular Biology: Synthetic Biology and Cellular Enzymology: Read Less [-]

MCELLBI 218D Research Review in Biochemistry and Molecular Biology: Gene Regulation at the RNA Level 2 Units
Terms offered: Fall 2021, Spring 2021, Fall 2020
RNA elements involved in alternative splicing and other co-transcriptional mechanisms of regulation. Specific areas of interest include riboswitches and other structured RNA elements involved in gene regulation.
Research Review in Biochemistry and Molecular Biology: Gene Regulation at the RNA Level: Read More [+]

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: Hammond

Research Review in Biochemistry and Molecular Biology: Gene Regulation at the RNA Level: Read Less [-]

MCELLBI 218E Research Review in Biochemistry and Molecular Biology: Viruses as Models for Eukaryote Gene Expression and Replication 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Recent developments in eukaryote viral and cellular regulation. New concepts in transcription and RNA replication, with particular emphasis on virus-cell interactions.
Research Review in Biochemistry and Molecular Biology: Viruses as Models for Eukaryote Gene Expression and Replication: Read More [+]

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

Research Review in Biochemistry and Molecular Biology: Viruses as Models for Eukaryote Gene Expression and Replication: Read Less [-]
MCELLBI 218F Research Review in Biochemistry and Molecular Biology: Energy-dependent Proteases and Molecular Machines 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Our goals are to decipher the fundamental principles that govern substrate engagement, de-ubiquitylation, unfolding, and translocation by the proteasome.
Research Review in Biochemistry and Molecular Biology: Energy-dependent Proteases and Molecular Machines: Read More [+]
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
Research Review in Biochemistry and Molecular Biology: Energy-dependent Proteases and Molecular Machines: Read Less [-]

MCELLBI 218I Research Review in Biochemistry and Molecular Biology: Chemical Biology and Inorganic Chemistry 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Research and literature topics in chemical biology and inorganic chemistry relevant to human health and disease and energy science will be discussed.
Research Review in Biochemistry and Molecular Biology: Chemical Biology and Inorganic Chemistry: Read More [+]
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
Research Review in Biochemistry and Molecular Biology: Chemical Biology and Inorganic Chemistry: Read Less [-]

MCELLBI 218H Research Review in Biochemistry and Molecular Biology: Protein Synthesis in Bacteria and Mammals 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
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.
Research Review in Biochemistry and Molecular Biology: Protein Synthesis in Bacteria and Mammals: Read More [+]
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
Research Review in Biochemistry and Molecular Biology: Protein Synthesis in Bacteria and Mammals: Read Less [-]

MCELLBI 218J Research Review in Biochemistry and Molecular Biology: Advanced 20th Century Perspectives on Cancer Cell Genetics 2 Units
Terms offered: Fall 2021, Spring 2021, Fall 2020
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.
Research Review in Biochemistry and Molecular Biology: Advanced 20th Century Perspectives on Cancer Cell Genetics: Read More [+]
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
Research Review in Biochemistry and Molecular Biology: Advanced 20th Century Perspectives on Cancer Cell Genetics: Read Less [-]
MCELLBI 218K Gene Editing for Fundamental Biology and Therapeutics 2 Units
Terms offered: Fall 2020, Spring 2020, Fall 2019
The use of genome engineering to study cellular signaling (especially ubiquitin-mediated signals) and develop potential new therapeutics and diagnostics will be covered in research reports and reviews of the current literature and in discussion of current experiments in the field.

Gene Editing for Fundamental Biology and Therapeutics: Read More [+]

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: Corn

MCELLBI 218M Research Review in Molecular Mechanisms of Membrane Transport 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
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.
Research Review in Molecular Mechanisms of Membrane Transport: Read More [+]

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 218N Research Review in Understanding and Exploiting Complex Biological Processes and Machines 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Covers aspects of ribosome engineering, organelle imaging and interactions, protein delivery, and cell signaling.
Research Review in Understanding and Exploiting Complex Biological Processes and Machines: Read More [+]

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 218O Research Review in Biochemistry and Molecular Biology: Chemical Biology and Enzymology 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Topics at the interface of chemistry and biology with a particular focus on mechanisms of enzyme catalysis.
Research Review in Biochemistry and Molecular Biology: Chemical Biology and Enzymology: Read More [+]

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

Research Review in Biochemistry and Molecular Biology: Chemical Biology and Enzymology: Read Less [-]
MCELLBI 218P Research Review in Biochemistry and Molecular Biology: Chemical Biology and Neuroscience 2 Units

Terms offered: Spring 2022, Fall 2021, Spring 2021
Molecular approaches to designing and deploying tools for voltage imaging and brain mapping.
Research Review in Biochemistry and Molecular Biology: Chemical Biology and Neuroscience: Read More [+]

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

Research Review in Biochemistry and Molecular Biology: Chemical Biology and Neuroscience: Read Less [-]

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

Terms offered: Spring 2022, Fall 2021, Spring 2021
Yıldız 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.
Research Review in Biochemistry and Molecular Biology: Single Molecular Imaging of Macromolecular Enzymes: Read More [+]

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

Research Review in Biochemistry and Molecular Biology: Single Molecular Imaging of Macromolecular Enzymes: Read Less [-]

MCELLBI 218R Research Review in Biochemistry and Molecular Biology: The Protein Folding Problem 2 Units

Terms offered: Spring 2022, Fall 2021, Spring 2021
Protein structure, stability, design, and the pathway of protein folding. Research Review in Biochemistry and Molecular Biology: The Protein Folding Problem: Read More [+]

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

Research Review in Biochemistry and Molecular Biology: The Protein Folding Problem: Read Less [-]

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

Terms offered: Spring 2022, Fall 2021, Spring 2021
Structure-function studies of the cytoskeleton and large molecular machines by cryo-electron microscopy and image reconstruction.
Research Review in Biochemistry and Molecular Biology: Cryo-Electron Microscopy of Macromolecules: Read More [+]

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

Research Review in Biochemistry and Molecular Biology: Cryo-Electron Microscopy of Macromolecules: Read Less [-]
MCELLBI 218T Electron Cryo-tomography of Macromolecular Complexes 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
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.
Electron Cryo-tomography of Macromolecular Complexes: Read More [+] 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
Electron Cryo-tomography of Macromolecular Complexes: Read Less [-]

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.
Research Review in Biochemistry and Molecular Biology: Biophysics of Macromolecule Transport Across Membranes: Read More [+] 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
Research Review in Biochemistry and Molecular Biology: Biophysics of Macromolecule Transport Across Membranes: Read Less [-]

MCELLBI 218X Research Review in Biochemistry and Molecular Biology: Chemical Reactions of Metabolism 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Define how metabolic reactions function in the context of the cellular system in order to elucidate the so-called design principles of metabolic function.
Research Review in Biochemistry and Molecular Biology: Chemical Reactions of Metabolism: Read More [+] 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
Research Review in Biochemistry and Molecular Biology: Chemical Reactions of Metabolism: Read Less [-]

MCELLBI 218Z Molecular and Cellular Mechanisms of Nutrient Sensing 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
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.
Molecular and Cellular Mechanisms of Nutrient Sensing: Read More [+] 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
Molecular and Cellular Mechanisms of Nutrient Sensing: Read Less [-]
**MCELLBI 219A Structural Membrane Biology**

*2 Units*

Terms offered: Spring 2022, Fall 2021, Spring 2021

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: Spring 2022, Fall 2021, Spring 2021

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 219F Research Review in Biochemistry and Molecular Biology:**

*Eukaryotic Gene Expression 2 Units*

Terms offered: Spring 2022, Fall 2021, Spring 2021

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

**MCELLBI 219G Virus-Host Interactions**

*2 Units*

Terms offered: Spring 2022, Fall 2021, Spring 2021

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
MCELLBI 219H Research Review in Biochemistry and Molecular Biology: Molecular and Cell Biology of Listeria monocytogenes Pathogenesis 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Discussion of recent research on the genetics, cell biology, and immunology of the model facultative intracellular bacterial pathogen, Listeria monocytogenes. 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.
Topics include:
- RNA structure, folding, and function. Specific topics include ribozyme mechanisms, RNA-mediated translation initiation, and protein targeting and secretion.

MCELLBI 219J Research Review in Biochemistry and Molecular Biology: Structure and Function of RNA 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
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.
Topics include:
- RNA structure, folding, and function. Specific topics include ribozyme mechanisms, RNA-mediated translation initiation, and protein targeting and secretion.

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.

MCELLBI 219S Research Review in Biochemistry and Molecular Biology: Structural Biology of Signaling and Replication 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
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.
MCELLBI 219T Research Review in Biochemistry and Molecular Biology: Signal Transduction Mechanisms 2 Units
Terms offered: Fall 2021, Spring 2021, Fall 2020
Discussion of recent research on various aspects of signal transduction mechanisms in eukaryotic cells, including G protein-coupled receptors, protein kinase cascades, synthesis and mobilization of lipid mediators, calcium sensing and response pathways, activation and inhibition of gene expression, and the biochemical basis of signal desensitization and physiological adaptation, with strong emphasis on genetic and molecular analysis of these systems, especially in the yeast.

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: Thorner

Research Review in Biochemistry and Molecular Biology: Signal Transduction Mechanisms: Read More [+]

MCELLBI 219U Research Review in Biochemistry and Molecular Biology: Single Molecule Biophysics 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Methods of single molecule manipulation and visualization that are used to characterize the structure and mehanochemical 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

Research Review in Biochemistry and Molecular Biology: Single Molecule Biophysics: Read More [-]

MCELLBI 219X Research Review in Biochemistry and Molecular Biology: Cell Surface Glycoconjugate Interactions 2 Units
Terms offered: Fall 2020, Spring 2018, Fall 2017

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: Bertozzi

Research Review in Biochemistry and Molecular Biology: Cell Surface Glycoconjugate Interactions: Read Less [-]
MCELLBI 219Y Research Review in Biochemistry and Molecular Biology: Regulation of HIV Gene Expression 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
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.
Research Review in Biochemistry and Molecular Biology: Regulation of HIV Gene Expression: Read More [+]

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
Research Review in Biochemistry and Molecular Biology: Regulation of HIV Gene Expression: Read Less [-]

MCELLBI 219Z Research Review in Biochemistry and Molecular Biology: Polymerase and RNA Biochemistry and Biology 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Emphasizes eukaryotic retroelement reverse transcriptases and retroelement mobility.
Research Review in Biochemistry and Molecular Biology: Polymerase and RNA Biochemistry and Biology: Read More [+]

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
Research Review in Biochemistry and Molecular Biology: Polymerase and RNA Biochemistry and Biology: Read Less [-]

MCELLBI 230 Advanced Cell and Developmental Biology 4 Units
Terms offered: Spring 2022, Spring 2021, Spring 2020
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 helpful, but not essential.
Advanced Cell and Developmental Biology: Read More [+]

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.
Advanced Cell and Developmental Biology: Read Less [-]

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.
Advanced Developmental and Stem Cell Biology: Read More [+]

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.
Advanced Developmental and Stem Cell Biology: Read Less [-]
MCELLBI 236 Advanced Mammalian Physiology 5 Units
Terms offered: Fall 2021, Fall 2020, Fall 2019
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.
Advanced Mammalian Physiology: Read More [+]

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.

Advanced Mammalian Physiology: Read Less [-]

MCELLBI 237L Advanced Physical Biology of the Cell 4 Units
Terms offered: Spring 2020, Spring 2019
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.
Advanced Physical Biology of the Cell: Read More [+]

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.

Advanced Physical Biology of the Cell: Read Less [-]

MCELLBI 239A Research Review in Cell and Developmental Biology: Mechanisms of lipid homeostasis and lipotoxicity 2 Units
Terms offered: Spring 2022, Fall 2021, Fall 2007
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.
Research Review in Cell and Developmental Biology: Mechanisms of lipid homeostasis and lipotoxicity: Read More [+]

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

Research Review in Cell and Developmental Biology: Mechanisms of lipid homeostasis and lipotoxicity: Read Less [-]
MCELLBI 239B Research Review in Cell and Developmental Biology: Regulation of the Cell Cycle 2 Units

Terms offered: Spring 2022, Fall 2021, Spring 2021
Review of current literature and discussion of original research.
Research Review in Cell and Developmental Biology: Regulation of the Cell Cycle: Read More [+]

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

Research Review in Cell and Developmental Biology: Regulation of the Cell Cycle: Read Less [-]

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

Terms offered: Spring 2022, Fall 2021, Spring 2021
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 based on optical microscopy, force microscopy, and microfabrication.
Research Review in Cell and Developmental Biology: Mechanics and Dynamics of Cell Movements: Read More [+]

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

Research Review in Cell and Developmental Biology: Mechanics and Dynamics of Cell Movements: Read Less [-]

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

Terms offered: Spring 2022, Fall 2021, Spring 2021
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.
The Regulation of Meiotic Gene Expression and Cellular Morphogenesis: Read More [+]

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

The Regulation of Meiotic Gene Expression and Cellular Morphogenesis: Read Less [-]

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

Terms offered: Spring 2022, Fall 2021, Spring 2021
Review of current literature and discussion of original research.
Research Review in Cell and Developmental Biology: Cell Morphogenesis: Read More [+]

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

Research Review in Cell and Developmental Biology: Cell Morphogenesis: Read Less [-]
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. Research Review in Cell and Developmental Biology: Nucleocytoplasmic Transport: Read More [+]

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
Research Review in Cell and Developmental Biology: Nucleocytoplasmic Transport: Read Less [-]

MCELLBI 239FF Research Review in Cell and Developmental Biology: Signal Transduction and Tumor Suppressor Genes 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Review of current literature and discussion of original research. Review in Cell and Developmental Biology: Signal Transduction and Tumor Suppressor Genes: Read More [+]

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
Research Review in Cell and Developmental Biology: Signal Transduction and Tumor Suppressor Genes: Read Less [-]

MCELLBI 239G Research Review in Cell and Developmental Biology: Mitochondrial biology 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
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. Research Review in Cell and Developmental Biology: Mitochondrial biology: Read More [+]

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
Research Review in Cell and Developmental Biology: Mitochondrial biology: Read Less [-]

MCELLBI 239HH Research Review in Cell and Developmental Biology: Mechanisms of Control of Growth and Cell Proliferation 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Identifying pathways that restrict growth and cell proliferation in vivo. Research Review in Cell and Developmental Biology: Mechanisms of Control of Growth and Cell Proliferation: Read More [+]

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
Research Review in Cell and Developmental Biology: Mechanisms of Control of Growth and Cell Proliferation: Read Less [-]
MCELLBI 239I Research Review in Cell and Developmental Biology: Cytoskeleton and Cell Motility 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Review of current literature and discussion of original research.
Research Review in Cell and Developmental Biology: Cytoskeleton and Cell Motility: Read More [+]

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

Research Review in Cell and Developmental Biology: Cytoskeleton and Cell Motility: Read Less [-]

MCELLBI 239J Research Review in Cell and Developmental Biology: Steroid Hormone and Growth Factor Action 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Review of current literature and discussion of original research.
Research Review in Cell and Developmental Biology: Steroid Hormone and Growth Factor Action: Read More [+]

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

Research Review in Cell and Developmental Biology: Steroid Hormone and Growth Factor Action: Read Less [-]

MCELLBI 239K Research Review in Cell and Developmental Biology: Secretion and Cell Membrane Assembly 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Cell surface growth with emphasis on the unicellular eukaryote S. cerevisiae.
Research Review in Cell and Developmental Biology: Secretion and Cell Membrane Assembly: Read More [+]

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

Research Review in Cell and Developmental Biology: Secretion and Cell Membrane Assembly: Read Less [-]

MCELLBI 239KK Research Review in Cell and Developmental Biology: Assembly and Subcellular Organization of Bacterial Organelles 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Review of current literature and discussion of original research.
Research Review in Cell and Developmental Biology: Assembly and Subcellular Organization of Bacterial Organelles: Read More [+]

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

Research Review in Cell and Developmental Biology: Assembly and Subcellular Organization of Bacterial Organelles: Read Less [-]
MCELLBI 239M Research Review in Cell and Developmental Biology: MicroRNA Functions in Cancer Development, Mouse Tumor Models 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Malignant transformation represents the endpoint of successive genetic lesions that confer uncontrolled proliferation and survival, unlimited replicative potential, and invasive growth.
Research Review in Cell and Developmental Biology: MicroRNA Functions in Cancer Development, Mouse Tumor Models: Read More [+]

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

Research Review in Cell and Developmental Biology: MicroRNA Functions in Cancer Development, Mouse Tumor Models: Read Less [-]

MCELLBI 239O Research Review in Cell and Developmental Biology: Cancer Biology 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Inheritance, chromatin structure, gene expression, and the organization of chromosomes in the nucleus.
Research Review in Cell and Developmental Biology: Cancer Biology: Read More [+]

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

Research Review in Cell and Developmental Biology: Cancer Biology: Read Less [-]

MCELLBI 239P Research Review in Cell and Developmental Biology: Energy Metabolism and Aging 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Research Review in Cell and Developmental Biology: Energy Metabolism and Aging: Read More [+]

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

Research Review in Cell and Developmental Biology: Energy Metabolism and Aging: Read Less [-]

MCELLBI 239Q Research Review in Cell and Developmental Biology: Regulation of Cell Polarity in Drosophila 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Mechanisms underlying the establishment and maintenance of cellular organization in epithelia and other cell types.
Research Review in Cell and Developmental Biology: Regulation of Cell Polarity in Drosophila: Read More [+]

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

Research Review in Cell and Developmental Biology: Regulation of Cell Polarity in Drosophila: Read Less [-]
MCELLBI 239R Research Review in Cell and Developmental Biology: Telomere Biology of Human Stem Cells 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
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.
Research Review in Cell and Developmental Biology: Telomere Biology of Human Stem Cells: Read More [+]

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
Research Review in Cell and Developmental Biology: Telomere Biology of Human Stem Cells: Read Less [-]

MCELLBI 239T Research Review in Cell and Developmental Biology: The Cell Biology of Fertilization 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
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.
Research Review in Cell and Developmental Biology: The Cell Biology of Fertilization: Read More [+]

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
Research Review in Cell and Developmental Biology: The Cell Biology of Fertilization: Read Less [-]

MCELLBI 239U Research Review in Cell and Developmental Biology: The Cytoskeleton and Morphogenesis 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Review of current literature and discussion of current research.
Research Review in Cell and Developmental Biology: The Cytoskeleton and Morphogenesis: Read More [+]

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
Research Review in Cell and Developmental Biology: The Cytoskeleton and Morphogenesis: Read Less [-]
MCELLBI 239V Research Review in Cell and Developmental Biology: Molecular Mechanisms of Transduction in Touch and Pain Receptors 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Review of current literature and discussion of current research. Current research focuses on elucidating the molecular mechanisms of somatosensory mechanotransduction.
Research Review in Cell and Developmental Biology: Molecular Mechanisms of Transduction in Touch and Pain Receptors: Read More [+]

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
Research Review in Cell and Developmental Biology: Molecular Mechanisms of Transduction in Touch and Pain Receptors: Read Less [-]

MCELLBI 239Z Research Review in Cell and Developmental Biology: Chromosome Remodeling and Reorganization During Meiosis 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
How chromosomes are reorganized during meiosis to accomplish the pairing, recombination, and segregation leading up to successful gamete production.
Research Review in Cell and Developmental Biology: Chromosome Remodeling and Reorganization During Meiosis: Read More [+]
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
Research Review in Cell and Developmental Biology: Chromosome Remodeling and Reorganization During Meiosis: Read Less [-]

MCELLBI 239W Research Review in Cell and Developmental Biology: Leech Embryology and Development 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Review of current literature and discussion of original research.
Research Review in Cell and Developmental Biology: Leech Embryology and Development: Read More [+]

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
Research Review in Cell and Developmental Biology: Leech Embryology and Development: Read Less [-]

MCELLBI 240 Advanced Genetic Analysis 4 Units
Terms offered: Spring 2022, Spring 2021, Spring 2020
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.
Advanced Genetic Analysis: Read More [+]
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
Advanced Genetic Analysis: Read Less [-]
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.
Seq: Methods and Applications: Read More [+]
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
Seq: Methods and Applications: Read Less [-]

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.
Discrete Mathematics for the Life Sciences: Read More [+]
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: Rio
Also listed as: MATH C239
Discrete Mathematics for the Life Sciences: Read Less [-]

MCELLBI 249BB Research Review in Genetics and Development: Aging and Protein Homeostasis 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
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.
Research Review in Genetics and Development: Aging and Protein Homeostasis: Read More [+]
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
Research Review in Genetics and Development: Aging and Protein Homeostasis: Read Less [-]

MCELLBI 249C Research Review in Genetics and Development: Nucleic Acid-Protein Interactions and Control of Gene Expression 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Biochemical and molecular genetic aspects of eukaryotic messenger RNA splicing and transposition, with an emphasis on as an experimental system.
Research Review in Genetics and Development: Nucleic Acid-Protein Interactions and Control of Gene Expression: Read More [+]
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
Research Review in Genetics and Development: Nucleic Acid-Protein Interactions and Control of Gene Expression: Read Less [-]
MCELLBI 249D Research Review in Genetics and Development: Mechanisms of Genetic Regulation in Yeast 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Genes, gene products and molecular mechanisms that control cell types in the unicellular eukaryote.
Research Review in Genetics and Development: Mechanisms of Genetic Regulation in Yeast: Read More [+]
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
Research Review in Genetics and Development: Mechanisms of Genetic Regulation in Yeast: Read Less [-]

MCELLBI 249E Research Review in Genetics and Development: Molecular Genetics of Drosophila 2 Units
Terms offered: Spring 2005, Fall 2004, Spring 2004
Gene regulation and developmental neurobiology.
Research Review in Genetics and Development: Molecular Genetics of Drosophila: Read More [+]
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: G. Rubin
Research Review in Genetics and Development: Molecular Genetics of Drosophila: Read Less [-]

MCELLBI 249F Research Review in Genetics and Development: Neuronal Development 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Molecular and genetic approaches to the problem of how neurons develop, with emphasis on and .
Research Review in Genetics and Development: Neuronal Development: Read More [+]
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
Research Review in Genetics and Development: Neuronal Development: Read Less [-]

MCELLBI 249G Research Review in Genetics and Development: Developmental and Evolutionary Genetics 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
We study how genes control pattern formation during development and pattern modification during evolution.
Research Review in Genetics and Development: Developmental and Evolutionary Genetics: Read More [+]
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
Research Review in Genetics and Development: Developmental and Evolutionary Genetics: Read Less [-]
MCELLBI 249H Investigating Cellular Aging and Chromosome Segregation during Gametogenesis 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
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.
Investigating Cellular Aging and Chromosome Segregation during Gametogenesis: Read More [+]

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: Spring 2022, Fall 2021, Spring 2021
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.
Research Review in Genetics and Development: Human Population Genetics and Evolutionary Biology: Read More [+]

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: Spring 2022, Fall 2021, Spring 2021

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
Research Review in Genetics and Development: RNA Systems Biology: Read Less [-]

MCELLBI 249J Research Review in Genetics and Development: Developmental and Molecular Genetics of C. elegans 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Molecular and genetical analysis of sex determination and dosage compensation in the nematode . Research Review in Genetics and Development: Developmental and Molecular Genetics of C. elegans: Read More [+]

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
Research Review in Genetics and Development: Developmental and Molecular Genetics of C. elegans: Read Less [-]

MCELLBI 249K Research Review in Genetics and Development: Animal Origins 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Evaluation of current research on choanoflagellates, sponges, and animal origins. Intended to complement ongoing research for graduate students. Research Review in Genetics and Development: Animal Origins: Read More [+]

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
Research Review in Genetics and Development: Animal Origins: Read Less [-]

MCELLBI 249L Imaging Single Molecules: Fashion or Game Changer? 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
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. Imaging Single Molecules: Fashion or Game Changer?: Read More [+]

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
Imaging Single Molecules: Fashion or Game Changer?: Read Less [-]
**MCELLBI 249M Research Review in Genetics and Development: Saccharomyces Cerevisiae Microtubule Cytoskeleton 2 Units**

Terms offered: Spring 2022, Fall 2021, Spring 2021
Review of current literature and discussion of current research.
Research Review in Genetics and Development: Saccharomyces Cerevisiae Microtubule Cytoskeleton: Read More [+]

**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

Research Review in Genetics and Development: Saccharomyces Cerevisiae Microtubule Cytoskeleton: Read Less [-]

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**MCELLBI 249MM Physical Biology of Living Organisms 2 Units**

Terms offered: Spring 2022, Fall 2021, Spring 2021
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.

Physical Biology of Living Organisms: Read More [+]

**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

Physical Biology of Living Organisms: Read Less [-]
MCELLBI 249N Research Review in Genetics and Development: Gene Regulation 2 Units
Terms offered: Fall 2019, Fall 2018, Fall 2017
Current literature and research in gene regulation will be covered in research reports and reviews of the current literature and in discussion of current experiments in the field.
Research Review in Genetics and Development: Gene Regulation: Read More [+]
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: Levine
Research Review in Genetics and Development: Gene Regulation: Read Less [-]

MCELLBI 249O Research Review in Genetics and Development: Genome Sequences 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Biochemistry, cancer biology and virology, cell biology, computational biology, genetics, microbiology, molecular and cell physiology.
Research Review in Genetics and Development: Genome Sequences: Read More [+]
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
Research Review in Genetics and Development: Genome Sequences: Read Less [-]

MCELLBI 249P Research Review in Genetics and Development: Evolution of Genome Structure and Cellular Diversity 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2015
Review of current literature and discussion of original research in the evolution of genome structure, aging, and cellular and organismal diversity.
Research Review in Genetics and Development: Evolution of Genome Structure and Cellular Diversity: Read More [+]
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
Research Review in Genetics and Development: Evolution of Genome Structure and Cellular Diversity: Read Less [-]

MCELLBI 249Q Research Review in Genetics and Development: Computational Genomics 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Recent developments in computational methods for genomics and their application for understanding the structure and function of genes encoded in completely sequenced genomes.
Research Review in Genetics and Development: Computational Genomics: Read More [+]
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
Research Review in Genetics and Development: Computational Genomics: Read Less [-]
MCELLBI 249S Research Review in Genetics and Development: Evolution of Development Mechanisms 2 Units
Terms offered: Fall 2020, Fall 2019, Spring 2019
Evolution of development mechanisms with a focus on the genes that regulate segmentation and regionalization of the body plan.
Research Review in Genetics and Development: Evolution of Development Mechanisms: Read More [+]

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: Patel

Research Review in Genetics and Development: Evolution of Development Mechanisms: Read Less [-]

MCELLBI 249T Research Review in Genetics, Genomics and Development: Evolution of Genomes 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Comparative analysis of eukaryotic genomes to inform the origins and diversification of animals and plants.
Research Review in Genetics, Genomics and Development: Evolution of Genomes: Read More [+]

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

Research Review in Genetics, Genomics and Development: Evolution of Genomes: Read Less [-]

MCELLBI 249V Research Review in Genetics and Development: Induction in Vertebrate Development and ES Cell Differentiation 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
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.
Research Review in Genetics and Development: Induction in Vertebrate Development and ES Cell Differentiation: Read More [+]

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

Research Review in Genetics and Development: Induction in Vertebrate Development and ES Cell Differentiation: Read Less [-]

MCELLBI 249W Research Review in Genetics and Development: Archaeal Genetics and Methane Metabolism 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
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.
Research Review in Genetics and Development: Archaeal Genetics and Methane Metabolism: Read More [+]

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

Research Review in Genetics and Development: Archaeal Genetics and Methane Metabolism: Read Less [-]
MCELLBI 249X Research Review in Genetics and Development: Comparative Genomics and Computational Biology 2 Units
Terms offered: Spring 2021, Fall 2020, Spring 2020
The fundamental problem of comparative genomics: the determination of the origins and evolutionary history of the nucleotides in all extant genomes. My work incorporates various aspects of genomics, including the reconstruction of ancestral genomes (paleogenomics), the modeling of genome dynamics (phylogenomics and systems biology), and the assignment of function of genome elements (functional genomics and epigenomics).
Research Review in Genetics and Development: Comparative Genomics and Computational Biology: Read More [+]

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: Pachter

Research Review in Genetics and Development: Comparative Genomics and Computational Biology: Read Less [-]

MCELLBI 249Y Research Review in Genetics and Development: Mechanisms of Gene Control in Vertebrate Animals 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
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).
Research Review in Genetics and Development: Mechanisms of Gene Control in Vertebrate Animals: Read More [+]

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

Research Review in Genetics and Development: Mechanisms of Gene Control in Vertebrate Animals: Read Less [-]
MCELLBI 249Z Research Review in Genetics and Development: Chromosome Structure and Integrity, Genome Evolution 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Use of genetic, cell biological, and biochemical approaches in budding yeast to understand genome integrity, genome evolution, and most recently desiccation tolerance.
Research Review in Genetics and Development: Chromosome Structure and Integrity, Genome Evolution: Read More [+]

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

Research Review in Genetics and Development: Chromosome Structure and Integrity, Genome Evolution: Read Less [-]

MCELLBI 250 Advanced Immunology 4 Units
Terms offered: Spring 2022, Spring 2021, Spring 2020
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.
Advanced Immunology: Read More [+]

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.
Instructor: Winoto

Advanced Immunology: Read Less [-]

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.
The Regulation of Immune System Development and Function: Read More [+]

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

The Regulation of Immune System Development and Function: Read Less [-]

MCELLBI 259A Mycobacterium Tuberculosis (Mt) 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
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 Mt 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.
Mycobacterium Tuberculosis (Mt): Read More [+]

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

Mycobacterium Tuberculosis (Mt): Read Less [-]
MCELLBI 259B Research Review in Immunology and Pathogenesis: Specificity of T Lymphocytes 2 Units
Terms offered: Spring 2019, Fall 2018, Spring 2018
Mechanisms of immune surveillance by T lymphocytes.
Research Review in Immunology and Pathogenesis: Specificity of T Lymphocytes: Read More [+]

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: Shastri

Research Review in Immunology and Pathogenesis: Specificity of T Lymphocytes: Read Less [-]

MCELLBI 259C Research Review in Immunology and Pathogenesis: Nuclear Receptor-Mediated Regulation of Neuroinflammation 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
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?
Research Review in Immunology and Pathogenesis: Nuclear Receptor-Mediated Regulation of Neuroinflammation: Read More [+]

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

Research Review in Immunology and Pathogenesis: Nuclear Receptor-Mediated Regulation of Neuroinflammation: Read Less [-]

MCELLBI 259D Research Review in Immunology and Pathogenesis: Mycobacterial Biology and Host-Pathogen Interactions 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
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.
Research Review in Immunology and Pathogenesis: Mycobacterial Biology and Host-Pathogen Interactions: Read More [+]

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

Research Review in Immunology and Pathogenesis: Mycobacterial Biology and Host-Pathogen Interactions: Read Less [-]

MCELLBI 259E Research Review in Immunology and Pathogenesis: Regulation of T Cell Receptor Genes Expression 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Molecular biology of T cell receptor genes and their transcription controlling proteins/genes. Programmed cell death during thymocyte differentiation.
Research Review in Immunology and Pathogenesis: Regulation of T Cell Receptor Genes Expression: Read More [+]

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

Research Review in Immunology and Pathogenesis: Regulation of T Cell Receptor Genes Expression: Read Less [-]
MCELLBI 259F Research Review in Immunology and Pathogenesis: Natural Killer (NK) Cell and T Cell Receptors 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Molecular and biological basis for recognition by natural killer cells and T cells.
Research Review in Immunology and Pathogenesis: Natural Killer (NK) Cell and T Cell Receptors: Read More [+]

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 259H Research Review in Immunology and Pathogenesis: B Cell Differentiation 2 Units
Terms offered: Fall 2021, Fall 2020, Fall 2019
Molecular basis of terminal B cell differentiation. Role of transcription factors in B cell activation.
Research Review in Immunology and Pathogenesis: B Cell Differentiation: Read More [+]

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

Research Review in Immunology and Pathogenesis: T Cell Development: Read Less [-]

MCELLBI 259G Research Review in Immunology and Pathogenesis: T Cell Development 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Molecular and cellular aspects of thymocyte differentiation.
Research Review in Immunology and Pathogenesis: T Cell Development: Read More [+]

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

Research Review in Immunology and Pathogenesis: Immune Evasion by Viruses: Read Less [-]

MCELLBI 259J Research Review in Immunology and Pathogenesis: Immune Evasion by Viruses 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
The mechanisms used by viruses to counteract the pressure of the immune system.
Research Review in Immunology and Pathogenesis: Immune Evasion by Viruses: Read More [+]

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

Research Review in Immunology and Pathogenesis: B Cell Differentiation: Read Less [-]
MCELLBI 259K Research Review in Immunology and Pathogenesis: Epigenetic Control for Regulatory T Cell Function in Cancer and Autoimmunity 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
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.
Research Review in Immunology and Pathogenesis: Epigenetic Control for Regulatory T Cell Function in Cancer and Autoimmunity: Read More [+]
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

Research Review in Immunology and Pathogenesis: Epigenetic Control for Regulatory T Cell Function in Cancer and Autoimmunity: Read Less [-]

MCELLBI 259M Research Review in Immunology and Pathogenesis: Innate Immunity and Innate Control of Adaptive Immunity 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Innate immunity and innate control of adaptive immunity.
Research Review in Immunology and Pathogenesis: Innate Immunity and Innate Control of Adaptive Immunity: Read More [+]
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

Research Review in Immunology and Pathogenesis: Innate Immunity and Innate Control of Adaptive Immunity: Read Less [-]

MCELLBI 259N Research Review in Immunology and Pathogenesis: Immunology, Microbiology, and Genetics of Bacterial Pathogenesis 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Role of innate host responses in defense against intracellular bacterial pathogens.
Research Review in Immunology and Pathogenesis: Immunology, Microbiology, and Genetics of Bacterial Pathogenesis: Read More [+]
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

Research Review in Immunology and Pathogenesis: Immunology, Microbiology, and Genetics of Bacterial Pathogenesis: Read Less [-]

MCELLBI C261 Cellular and Developmental Neurobiology 3 Units
Terms offered: Fall 2021, Fall 2020, Fall 2019
This course covers the molecular/cellular basis of neuron excitability (membrane potentials, action potential generation and propagation, ion channels), synaptic transmission and plasticity, sensory receptor function, and developmental neurobiology.
Cellular and Developmental Neurobiology: Read More [+]

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: NEUROSC C261
Cellular and Developmental Neurobiology: Read Less [-]
MCELLBI C262 Circuit and Systems Neurobiology 3 Units
Terms offered: Spring 2022, Spring 2021, Spring 2020
Advanced coverage of current research problems in systems-level neuroscience, and experimental and computational techniques used for these studies.
Circuit and Systems Neurobiology: Read More [+]
Rules & Requirements
Repeat rules: Course may be repeated for credit without restriction.
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: NEUROSC C262
Circuit and Systems Neurobiology: Read Less [-]

MCELLBI 269A Research Review in Neurobiology: Special Topics in Neuroplasticity 2 Units
Terms offered: Spring 2021, Spring 2020, Spring 2019
Molecular and cellular studies of nerve growth, axon guidance, synaptic formation, and synaptic plasticity using electrophysiological and optical imaging techniques.
Research Review in Neurobiology: Special Topics in Neuroplasticity: Read More [+]
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: Poo
Research Review in Neurobiology: Special Topics in Neuroplasticity: Read Less [-]

MCELLBI 269B Research Review in Neurobiology: Synaptic Transmission and Neurmodulation 2 Units
Terms offered: Fall 2021, Spring 2021, Fall 2020
Review of current literature and discussion of original research.
Research Review in Neurobiology: Synaptic Transmission and Neurmodulation: Read More [+]
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: Zucker
Research Review in Neurobiology: Synaptic Transmission and Neurmodulation: Read Less [-]

MCELLBI 269C Research Review in Neurobiology: Molecular Mechanisms of Neuronal Plasticity 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
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.
Research Review in Neurobiology: Molecular Mechanisms of Neuronal Plasticity: Read More [+]
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
Research Review in Neurobiology: Molecular Mechanisms of Neuronal Plasticity: Read Less [-]
MCELLBI 269D Research Review in Neurobiology: Signaling Within and Between Neurons 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Review of recent research in molecular mechanisms involved in intracellular and extracellular signaling in the nervous system.
Research Review in Neurobiology: Signaling Within and Between Neurons: Read More [+]
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

Research Review in Neurobiology: Signaling Within and Between Neurons: Read Less [-]

MCELLBI 269E Molecular and Biophysical Neuroscience 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Review of research in molecular and biophysical aspects of sensory transduction and electrical signaling in the nervous system.
Molecular and Biophysical Neuroscience: Read More [+]
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: Brohawn

Molecular and Biophysical Neuroscience: Read Less [-]

MCELLBI 269F Optogenetic Dissection of Neural Circuits 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Research review in neurobiology. Review of recent optogenetic strategies for dissecting neural connectivity, function, and dysfunction in the rodent and primate brain.
Optogenetic Dissection of Neural Circuits: Read More [+]
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

Optogenetic Dissection of Neural Circuits: Read Less [-]

MCELLBI 269G Research Review in Development and Application of Advanced Methods for In Vivo Imaging 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
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.
Research Review in Development and Application of Advanced Methods for In Vivo Imaging: Read More [+]
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

Research Review in Development and Application of Advanced Methods for In Vivo Imaging: Read Less [-]
MCELLBI 269I Research Review in Neurobiology: Stem Cells and Gene Therapy in the Nervous System 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
The basic investigation of neural differentiation of stem cells, as well as the use of stem cells and gene delivery for neuroregeneration.
Research Review in Neurobiology: Stem Cells and Gene Therapy in the Nervous System: Read More [+]
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
Research Review in Neurobiology: Stem Cells and Gene Therapy in the Nervous System: Read Less [-]

MCELLBI 269J Research Review in Neurobiology: Taste Recognition in Drosophila 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
The molecular and cellular basis of taste perception in the model organism.
Research Review in Neurobiology: Taste Recognition in Drosophila: Read More [+]
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
Research Review in Neurobiology: Taste Recognition in Drosophila: Read Less [-]

MCELLBI 269K Research Review in Neurobiology: Instructive Cues for Neural Form and Function 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Molecular and circuit studies of the mechanisms that specify synaptic properties and how these properties bias the timescales of neuronal computation.
Research Review in Neurobiology: Instructive Cues for Neural Form and Function: Read More [+]
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
Research Review in Neurobiology: Instructive Cues for Neural Form and Function: Read Less [-]

MCELLBI 269M Research Review in Neurobiology: Insect Neurophysiology 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Drosophila mutants that have behavioral abnormalities to unravel new and basic features of nervous system structure and function.
Research Review in Neurobiology: Insect Neurophysiology: Read More [+]
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
Research Review in Neurobiology: Insect Neurophysiology: Read Less [-]
MCELLBI 269O Research Review in Neurobiology: Neural Circuits for Sensory Processing and Behavior 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Microcircuitry of the cerebral cortex that underlies sensory processing and adaptive behavior. Research Review in Neurobiology: Neural Circuits for Sensory Processing and Behavior: Read More [+]
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
Research Review in Neurobiology: Neural Circuits for Sensory Processing and Behavior: Read Less [-]

MCELLBI 269P Research Review in Neurobiology: Visual Neuroscience 2 Units
Terms offered: Spring 2004, Fall 2003, Spring 2003
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. Research Review in Neurobiology: Visual Neuroscience: Read More [+]
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
Research Review in Neurobiology: Visual Neuroscience: Read Less [-]

MCELLBI 269Q Research Review in Neurobiology: Sensory Processing and Plasticity in Cerebral Cortex 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
How the cerebral cortex processes sensory input and stores information about the sensory world. We focus on the rat's primary somatosensory (S1) cortex. Research Review in Neurobiology: Sensory Processing and Plasticity in Cerebral Cortex: Read More [+]
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
Research Review in Neurobiology: Sensory Processing and Plasticity in Cerebral Cortex: Read Less [-]

MCELLBI 269R Research Review in Neurobiology: Potassium Channels and Synaptic Plasticity 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Review of current literature and discussion of original research. Research Review in Neurobiology: Potassium Channels and Synaptic Plasticity: Read More [+]
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
Research Review in Neurobiology: Potassium Channels and Synaptic Plasticity: Read Less [-]
MCELLBI 269S Research Review in Neurobiology: Molecular Mechanisms of Olfaction 2 Units
Terms offered: Fall 2021, Spring 2021, Fall 2020
Review of current literature and discussion of original research.
Research Review in Neurobiology: Molecular Mechanisms of Olfaction: Read More [+]

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: Ngai

Research Review in Neurobiology: Molecular Mechanisms of Olfaction: Read Less [-]

MCELLBI 269T Research Review in Neurobiology: Processing of Visual Information in the Mammalian Brain 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Review of current literature and discussion of original research.
Research Review in Neurobiology: Processing of Visual Information in the Mammalian Brain: Read More [+]

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

Research Review in Neurobiology: Processing of Visual Information in the Mammalian Brain: Read Less [-]

MCELLBI 269U Research Review in Neurobiology: Diseases/Retina 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Evaluation of current research in molecular mechanisms underlying diseases of the retina.
Research Review in Neurobiology: Diseases/Retina: Read More [+]

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

Research Review in Neurobiology: Diseases/Retina: Read Less [-]

MCELLBI 269W Research Review in Neurobiology: Neural Activity Affecting the Assembly of Neural Circuits 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
How neural activity affects the assembly of neural circuits.
Research Review in Neurobiology: Neural Activity Affecting the Assembly of Neural Circuits: Read More [+]

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

Research Review in Neurobiology: Neural Activity Affecting the Assembly of Neural Circuits: Read Less [-]
MCELLBI C277 Communicating Quantitative Information 2 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021, 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.
Communicating Quantitative Information: Read More [+]

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 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, microbiology and immunology, macromolecular structure and function, and scientific writing. Courses are taught in tandem and maybe taken individually.
Selected Topics in Molecular and Cell Biology: Read More [+]

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.
Selected Topics in Molecular and Cell Biology: Read Less [-]

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, microbiology and immunology, macromolecular structure and function, and scientific writing. Courses are taught in tandem and maybe taken individually.
Selected Topics in Molecular and Cell Biology: Read More [+]

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.
Selected Topics in Molecular and Cell Biology: Read Less [-]

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, microbiology and immunology, macromolecular structure and function, and scientific writing. Courses are taught in tandem and maybe taken individually.
Selected Topics in Molecular and Cell Biology: Read More [+]

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.
Selected Topics in Molecular and Cell Biology: Read Less [-]
MCELLBI 280D Selected Topics in Molecular and Cell Biology 1 Unit
Terms offered: Fall 2021, Fall 2020, Fall 2019
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, microbiology and immunology, macromolecular structure and function, and scientific writing. Courses are taught in tandem and maybe taken individually.
Selected Topics in Molecular and Cell Biology: Read More [+]
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.
Selected Topics in Molecular and Cell Biology: Read Less [-]

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, microbiology and immunology, macromolecular structure and function, and scientific writing. Courses are taught in tandem and maybe taken individually.
Selected Topics in Molecular and Cell Biology: Read More [+]
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.
Selected Topics in Molecular and Cell Biology: Read Less [-]

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, microbiology and immunology, macromolecular structure and function, and scientific writing. Courses are taught in tandem and maybe taken individually.
Selected Topics in Molecular and Cell Biology: Read More [+]
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.
Selected Topics in Molecular and Cell Biology: Read Less [-]

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.
Data Science for Molecular and Cell Biology: Read More [+]
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
Data Science for Molecular and Cell Biology: Read Less [-]
MCELLBI 290 Graduate Seminar 1 Unit
Terms offered: Spring 2022, Fall 2021, Spring 2021
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.
Graduate Seminar: Read More [+]

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.

Graduate Seminar: Read Less [-]

MCELLBI 291A Introduction to Research 2 - 12 Units
Terms offered: Fall 2021, Fall 2020, Fall 2019
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.
Introduction to Research: Read More [+]

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. Upon completion, the final grade will be applied to both parts of the series.

Introduction to Research: Read Less [-]

MCELLBI 291B Introduction to Research 2 - 12 Units
Terms offered: Spring 2022, Spring 2021, Spring 2020
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.
Introduction to Research: Read More [+]

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.

Introduction to Research: Read Less [-]

MCELLBI 292 Research 3 - 12 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Individual research under the supervision of a faculty member.
Research: Read More [+]

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.

Research: Read Less [-]
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.
Research: Read More [+]
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.

Research: Read Less [-]

MCELLBI 293A Research Seminar 2 Units
Terms offered: Fall 2021, Fall 2020, Fall 2019
Seminar on presentation and evaluation of results in area of student's individual research interests.
Research Seminar: Read More [+]
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.

Research Seminar: Read Less [-]

MCELLBI 293C Responsible Conduct in Research 1 Unit
Terms offered: Spring 2021, Spring 2020, Spring 2019
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.
Responsible Conduct in Research: Read More [+]
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
Responsible Conduct in Research: Read Less [-]

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.
Rigor and Reproducibility in Research: Read More [+]
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
Rigor and Reproducibility in Research: Read Less [-]
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.
Responsible Conduct of Research Refresher: Read More

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
Responsible Conduct of Research Refresher: Read Less

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.
Foundations of Biostatistical Practice: Read More

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.
Foundations of Biostatistical Practice: Read Less

MCELLBI 294 Current Topics in Biomedical Sciences 1 Unit
Terms offered: Spring 2022, Fall 2021, Spring 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.
Current Topics in Biomedical Sciences: Read More

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.
Current Topics in Biomedical Sciences: Read Less
MCELLBI 295 Careers for Life Sciences Ph.D’s 1 Unit
Terms offered: Spring 2022, Spring 2021, Spring 2020
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.
Careers for Life Sciences Ph.D's: Read More [+]
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.
Careers for Life Sciences Ph.D's: Read Less [-]

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.
Molecular and Cell Biology Colloquium: Read More [+]
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.
Molecular and Cell Biology Colloquium: Read Less [-]

MCELLBI C296 Doctoral Seminar in Computational Biology 2 Units
Terms offered: Fall 2021, Fall 2019, Fall 2018
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, 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.
Doctoral Seminar in Computational Biology: Read More [+]
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
Doctoral Seminar in Computational Biology: Read Less [-]

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.
Pedagogy for MCB Graduate Student Instructors: Read More [+]
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
Pedagogy for MCB Graduate Student Instructors: Read Less [-]
MCELLBI 380 Teaching of Molecular and Cell Biology 1 - 2 Units
Terms offered: Spring 2016, Fall 2015, Spring 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.
Teaching of Molecular and Cell Biology: Read More [+]  
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.

Rules & 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.
Teaching of Molecular and Cell Biology: Read Less [-]

MCELLBI 481B Instrumentation in Molecular and Cell Biology: Transmission Electron Microscopy 1 - 4 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Individualized laboratory instruction.
Instrumentation in Molecular and Cell Biology: Transmission Electron Microscopy: Read More [+]  
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
Instrumentation in Molecular and Cell Biology: Scanning Electron Microscopy: Read Less [-]

MCELLBI 481C Instrumentation in Molecular and Cell Biology: Scanning Electron Microscopy 1 - 4 Units
Terms offered: Spring 2022, Fall 2021, Spring 2021
Individualized laboratory instruction.
Instrumentation in Molecular and Cell Biology: Scanning Electron Microscopy: Read More [+]  
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
Instrumentation in Molecular and Cell Biology: Scanning Electron Microscopy: Read Less [-]

MCELLBI 481A Instrumentation in Molecular and Cell Biology: Fluorescence 1 - 4 Units
Terms offered: Spring 2007, Fall 2006, Spring 2001
Individualized laboratory instruction.
Instrumentation in Molecular and Cell Biology: Fluorescence Microscopy: Read More [+]  
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
Instrumentation in Molecular and Cell Biology: Fluorescence Microscopy: Read Less [-]

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.
Individual Study for Master’s Students: Read More [+]  
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.
Individual Study for Master's Students: Read Less [-]
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.

Individual Study for Doctoral Students: Read More [+]

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.

Individual Study for Doctoral Students: Read Less [-]