BIOMEDICAL SCIENCES (PHD)

Visit program website. (https://bms.ucsf.edu/)

Degree Offered: PhD
Program Leadership:
Adrian Erlebacher, MD, PhD, Director
Meredith Miner, Program Manager
Admissions Inquiries:
bmsadmissions@ucsf.edu

Program Description

The Biomedical Sciences (BMS) program is an interdisciplinary graduate research program that equips students with the training and research tools to dissect disease-related biology, from single cells to tissue and organ systems. Students in the BMS program must acquire a level of competence in molecular biology, genetics, and cell biology comparable to that expected of students in traditional programs focused in these areas. At the same time, the program incorporates the rigorous and molecular study of core developmental, physiological, and pathological features of human biology and disease.

The BMS curriculum results in a new generation of interdisciplinary biomedical scientists who are able to forge collaborations that break down traditional research boundaries.

Faculty

More than 300 faculty members are associated with the BMS program across more than 50 departments at UCSF.

Thematic Areas

- Cancer biology and cell signaling
- Developmental and stem cell biology
- Human genetics
- Immunology
- Neurobiology
- Tissue/organ biology and endocrinology
- Vascular and cardiac biology
- Virology and microbial pathogenesis

The BMS program office is located at the Parnassus campus. Labs and/or classrooms are located at the Mission Bay and Parnassus campuses as well as at San Francisco General Hospital, Mt. Zion, and the Veterans Administration Medical Center in San Francisco.

The BMS program is offered by the UCSF Division of Graduate Education and Postdoctoral Affairs, administered by the UCSF Graduate Medical Education Unit, and delivered by faculty members in the UCSF schools of medicine, pharmacy, and dentistry.

Learning Outcomes

Specific training program objectives for each BMS student include:

- Establishing a solid grounding in cellular and molecular biology, genetics and tissue and organ biology, and a broad understanding of human disease states.
- Acquiring a sophisticated awareness and practical exposure to research technologies, and experimental and quantitative approaches that are accelerating basic and translational research in the biomedical sciences.
- Establishing competency in core scientific and professional skills including: Rigorous experimental design, data collection, analysis and interpretation; critical evaluation of the scientific literature; identification of impactful and experimentally tractable research problems; formulation and writing of research proposals; oral presentation of scientific findings to diverse audiences; preparation and publication of scientific manuscripts.
- Establishing competency in working effectively and respectfully with diverse colleagues of varied cultural and personal backgrounds, promoting and supporting inclusive scientific environments.
- Performance, with increasing self-direction, of a body of basic and/or translational biomedical research that significantly advances the chosen field of study. Students are expected to complete their graduate studies in five to six years of full-time effort.

Additional Information

Program Core Faculty

- *Find a* program faculty list *(*https://bms.ucsf.edu/faculty/*) on the program website.*

Career Outcomes

- *Find* career outcomes and other data on PhD programs *(*https://graduate.ucsf.edu/program-statistics#career*) on the Graduate Education and Postdoctoral Affairs website.*

Degree Requirements

- Minimum GPA of 3.0
- All core courses and required activities taken and passed
- Six quarters in residence including a minimum of three quarters (enrolled in 8 units of BIOMED SCI 250 Research in each quarter) after advancement to candidacy
- Pass qualifying examination
- Completion and submission of the Dissertation
- For additional details, please see requirements for the Doctor of Philosophy degree.

Core Courses

Course	Title	Units
Year 1		
Fall Quarter		
BIOMED SCI 215	Laboratory Rotation [2]	1-8
BIOMED SCI 216	Supervised Study [1]	1-5
BIOMED SCI 221	Seminars in Biomedical Sciences [1]	1
BIOMED SCI 225A	Biostatistics and Computational Biology	2.5
BIOMED SCI 260	Cell and Molecular Biology	4
GRAD 202	Racism in Science	3
GRAD 214	Responsible Conduct of Research and Rigor & Reproducibility	0
	Units	**12.5-23.5**
Winter Quarter		
BIOMED SCI 215	Laboratory Rotation [2]	1-8
BIOMED SCI 216	Supervised Study [1]	1-5
BIOMED SCI 221	Seminars in Biomedical Sciences [1]	1
BIOMED SCI 225B	Science Communication for Biomedical Scientists [3]	3
BIOMED SCI 255	Basic Genetics & Genomics	4

GRAD 214	Responsible Conduct of Research and Rigor & Reproducibility	0
	Units	**10-21**
Spring Quarter		
BIOMED SCI 215	Laboratory Rotation [2]	1-8
BIOMED SCI 216	Supervised Study [1]	1-5
BIOMED SCI 221	Seminars in Biomedical Sciences [1]	1
BIOMED SCI 270	Special Topics in Biomedical Sciences [4]	3
GRAD 214	Responsible Conduct of Research and Rigor & Reproducibility	1.5
	Units	**7.5-18.5**
Year 2		
Fall Quarter		
BIOMED SCI 216	Supervised Study [1]	1-5
BIOMED SCI 221	Seminars in Biomedical Sciences [1]	1
BIOMED SCI 250	Research	1-8
	Units	**3-14**
Winter Quarter		
BIOMED SCI 216	Supervised Study [1]	1-5
BIOMED SCI 221	Seminars in Biomedical Sciences [1]	1
BIOMED SCI 250	Research	1-8
	Units	**3-14**
Spring Quarter		
BIOMED SCI 216	Supervised Study [1]	1-5
BIOMED SCI 221	Seminars in Biomedical Sciences [1]	1
BIOMED SCI 250	Research	1-8
	Units	**3-14**
	Total Units	**39-105**

1. 6 quarters required
2. 3 rotations required
3. MSTPs are exempt from taking BIOMED SCI 225B Science Communication for Biomedical Scientists as a core requirement. They can choose to take it as an elective.
4. Three instances of this course are required, or students can take other basic science minicourses to fulfill this requirement.

Elective Requirement

Can be fulfilled by taking two minicourses **or** a full-length course.

Approved Electives

Code	Title	Units
BIOCHEM 200A	Structure of Macromolecules	3
BIOCHEM 201A	Biological Regulatory Mechanisms	4
BIO MD INF 203	Biocomputing Algorithms	4
BIO MD INF 206	Statistical Methods for Bioinformatics	4
BIOPHYSICS 205B	Biophysics of Cells, Tissues, & Systems	3.5-4
DEV STMCEL 257	Developmental and Stem Cell Biology	4
BIOPHYSICS 241	Physical Biology	5
GENETICS 200A	Principles of Genetics	3
MICROBIOL 204	Molecular and Cellular Immunology	3
NEUROSCI 201A	Basic Concepts in Cellular and Molecular Neuroscience	5
NEUROSCI 201B	Basic Concepts for Cellular and Developmental Neuroscience	4
NEUROSCI 201C	Introduction to Systems and Behavioral Neuroscience	4
PHARMGENOM 245A	Basic Principles of Pharmaceutical Sciences	5
PHARMGENOM 245C	Principles of Pharmacogenomics	3

Other elective courses may be approved by the program as appropriate.

Non-course Core Requirements

- Teaching Assistantship – 1 quarter; 2nd year
- Qualifying Exam – must take before end of June of second year in program