BIOLOGICAL AND MEDICAL INFORMATICS (PHD)

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

Degree Offered: PhD
Program Leadership:
Tony Capra, Program Co-Director
Ryan Hernandez, Program Co-Director
Admissions Inquiries:
Lisa Magargal, Interim Program Coordinator

Program Description

The Biological and Medical Informatics program equips PhD students with the skills and knowledge in applied mathematics, informatics, statistics, computer science, physics, chemistry, and biology needed to study biological composition, structure, function, and evolution at the molecular, cellular, and systems levels. Students are involved with gathering, storing, analyzing, predicting, and disseminating complex information. The field is essential, for without quantitative analysis of the massive and growing amounts of biological data generated by various systems, biology and -omics data cannot be interpreted or exploited.

UCSF researchers pioneered many bioinformatics areas including data visualization, systems biology, protein structure prediction, and drug design. With faculty interests that include genetics, genomics, evolution, protein structure, systems biology, host-pathogen interactions, drug design, and cellular biology, students have a wide range of areas to explore and integrate. Members of the Bioinformatics faculty include members of the National Academy of Sciences, Howard Hughes Investigators, Searle Scholars, and National Institutes of Health (NIH) New Innovator Awardees.

Faculty

Over 40 faculty members teach and mentor students in the BMI program. Faculty members are affiliated with the departments of Pharmaceutical Chemistry, Bioengineering and Therapeutic Sciences, Cellular and Molecular Pharmacology, Biochemistry and Biophysics, Epidemiology and Biostatistics, Microbiology and Immunology, Medicine, Neurology, and Surgery; as well as the Gladstone Institute and Institute for Human Genetics.

Sub-disciplines

The BMI program is a member of the Quantitative Biosciences Consortium (https://qbc.ucsf.edu/) (QBC), and a founding member of the Integrative Program in Quantitative Biology (https://ipqb.ucsf.edu/) (iPQB) at UCSF.

- Bioinformatics and computational biology
- Genetics and genomics
- Complex biological systems

The BMI program office is located at the Mission Bay campus. Visit the program website (https://bmi.ucsf.edu/) for more information.

The BMI program is offered by the UCSF Graduate Division, administered by the UCSF School of Pharmacy, and delivered by faculty members in the UCSF schools of pharmacy and medicine.

Learning Outcomes

The BMI Program will provide our students with both a foundation in computational/statistical approaches and a sophisticated understanding of biology, including not only sophisticated computational approaches for modeling and data analysis, but also a deep understanding of how data are collected, processed, and interpreted.

The program seeks to bridge computational and biomedical research methods. In particular, the ability to use quantitative models to derive predictions that can be rigorously tested and to synthesize vast amounts of information into quantitative models, and effectively communicate their findings.

At the core of our program is an emphasis on scientific excellence and a focus on training in the tools, methods and knowledge necessary to conduct independent, rigorous, reproducible, and impactful research. Concurrently, we recognize that additional competencies—including leadership, management, effective written and oral presentation, communication and teamwork skills—are needed for our students to successfully compete in their future positions in academia, industry, or the public sector. To address this need, we provide proactive mentoring and diverse professional development opportunities to help each student optimally prepare for their careers.

Additional Information

Program Faculty

- *Find a* program faculty list *(*https://bioinformatics.ucsf.edu/people/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 Division website.*

Degree Requirements

- Minimum GPA of 3.0
- All core courses and required activities taken and passed
- Six quarters in residence plus a minimum of three registered quarters after advancement to candidacy
- Pass qualifying examination
- Completion and submission of the dissertation
- For additional details, please see graduate.ucsf.edu/phd-degree (https://graduate.ucsf.edu/phd-degree/)

Core Courses

Code	Title	Units
BIO MD INF 206	Statistical Methods for Bioinformatics (Fall)	4
BIO MD INF 203	Biocomputing Algorithms (Winter)	4
BIO MD INF 219	Special Topics in Bioinformatics (Spring) [1]	3
BIO MD INF 221	Informatics Rotation (Fall, Winter, Spring)	1-8
BIO MD INF 222	Student Informatics Seminar (Fall, Winter, Spring)	1
BIO MD INF 223	Critical Topics in Biomedical Informatics (first two years in program Fall, Winter, Spring)	1
BIO MD INF 220	Informatics Seminar (Fall, Winter, Spring)	1
BIO MD INF 250	Research (Fall, Winter, Spring)	4-8
GRAD 202	Racism in Science (Fall)	3

GRAD 214	Responsible Conduct of Research for Basic Scientists (Spring)	1.5
One elective course (Winter quarter)		
Total Units		**23.5-34.5**

[1] Choose three from all Basic Science programs, courses offered change annually.

Non-Course Core Requirements

Annual retreat with CCB, Biophysics, and PSPG programs; Introductory bootcamp before start of first year; Genetics-Genomics Fundamentals workshop first year before start of Fall course work.