# **Computational Biology**

### Graduate Division (<u>http://grad.berkeley.edu</u>) Center Information: 174 Stanley Hall MC#3220, (510) 666-3342

### Website: Center for Computational Biology (<u>http:// qb3.berkeley.edu/ccb</u>) Director: Rasmus Nielsen, PhD Graduate Chair: Steven Brenner, PhD

#### Overview

Computational biology is an academic growth area that binds together multiple areas of biological research with the mathematical and computational sciences. It takes center stage in the new data-oriented biology by facilitating scientific discoveries based on high-throughput methods. The genomic revolution has fundamentally changed the biological sciences, and computational biology provides the means by which we translate the genomic discoveries into a new understanding of complex biological systems, and eventually to improvements of the human condition through development of solutions to environmental problems, new drug discoveries, and personalized medicine.

The Center for Computational Biology is Berkeley's hub for research and training in computational biology and bioinformatics. Through courses, seminars, scientific meetings, and innovative training programs for PhD students (see below), the Center catalyzes biological discoveries at the interface of biology, computation, and mathematics/statistics. As a campus strategic initiative, the Center fosters an interactive, innovative, and collegial environment for faculty, students, and postdocs drawn from five colleges and over a dozen academic departments. Faculty research interests are likewise diverse, ranging from computational and statistical genomics to population, comparative, and functional genomics; from bioinformatics and proteomics to evolutionary biology, phylogenomics, and statistical and computational methods development for modeling biological systems.

#### **Graduate Programs**

The Center offers two graduate programs under auspices of the Computational Biology Graduate Group: (1) a PhD in Computational Biology; and (2) the Designated Emphasis in Computational and Genomic Biology, a graduate specialization for students in select PhD programs. With the exception of the three courses listed under the Course tab above, both programs draw upon departmental course offerings for their curricula. Please visit the programs' websites for course lists.

#### **Computational Biology PhD**

The goal of the Computational Biology PhD is to advance basic research at the interface of the biological, computational, mathematical, and physical sciences. The program is therefore intended for students who are both passionate about exploring the interface, and committed to functioning at a high level in both computational and biological fields. Though undergraduate preparation varies, entering students have demonstrated outstanding potential as a research scientist and have clear academic aptitude in multiple disciplines, as well as excellent communication skills. This is assessed based on research experience, grades, standardized exams, course selection, essays, personal background, and letters of recommendation. The program emphasizes research. As such, the curriculum design bends more toward biology programs than computational, requiring course work and laboratory rotations in the first year, and thesis research beginning in the second year. Because student backgrounds vary, the program tailors each student's coursework to meet their specific needs and interests. (Students should note that in some cases coursework may be necessary in the second year.) Students seeking detailed information about admission, curriculum, and sources of financial support should see the program's website (http://ccb.berkeley.edu/research-education/phd-in-computational-biology) or contact the staff adviser at compbiograd@berkeley.edu.

#### **Designated Emphasis (DE)**

For information regarding the Designated Emphasis in Computational and Genomic Biology, please see the program's page in this bulletin (<u>http://bulletin.berkeley.edu/archive/2013-14/departmentsandsubjects/</u> computationalandgenomicbiology).

#### **CMPBIO 201 Classics in Computational Biology 3 Units**

Department: Computational Biology

Course level: Graduate

Term course may be offered: Fall

Grading: Letter grade.

Hours and format: 1 hour of Lecture and 2 hours of Discussion per week for 15 weeks.

**Prerequisites:** Acceptance in the Computational Biology Phd program; consent of instructor.

Research project and approaches in computational biology. An introducton to the diverse ways biological problems are investigated computationally through critical evaluation of the classics and recent peer-reviewed literature. This is the core course required of all Computational Biology graduate students.

## CMPBIO 294A Introduction to Research in Computational Biology 2 - 12 Units

Department: Computational Biology Course level: Graduate Terms course may be offered: Fall and spring

Grading: Letter grade.

Hours and format: 2 to 20 hours of Laboratory per week for 15 weeks. **Prerequisites:** Standing as a Computational Biology graduate student. Closely supervised experimental or computational work under the direction of an individual faculty member; an introduction to methods and research approaches in particular areas of computational biology. Course may be repeated for credit. Course may be repeated for credit when topic changes.

## CMPBIO 294B Introduction to Research in Computational Biology 2 - 12 Units

Department: Computational Biology Course level: Graduate Terms course may be offered: Fall and spring Grading: Letter grade.

**Hours and format:** 2 to 20 hours of Laboratory per week for 15 weeks. **Prerequisites:** Standing as a Computational Biology graduate student. Closely supervised experimental or computational work under the direction of an individual faculty member; an introduction to methods and research approaches in particular areas of computational biology. Course may be repeated for credit. Course may be repeated for credit when topic changes.

#### CMPBIO 295 Individual Research for Doctoral Students 1 - 12 Units

Department: Computational Biology

Course level: Graduate

Terms course may be offered: Fall and spring Grading: Letter grade.

Hours and format: 1 to 20 hour of Laboratory per week for 15 weeks. **Prerequisites:** Acceptance in the Computational Biology PhD program; consent of instructor.

Laboratory research, conferences. Individual research under the supervision of a faculty member.

Course may be repeated for credit. Course may be repeated for credit when topic changes.