

INTEGRATED GRADUATE PROGRAM IN PHYSICAL AND ENGINEERING BIOLOGY (PEB)

<http://peb.yale.edu>
peb@yale.edu

Director

Corey O'Hern (*Mechanical Engineering and Materials Science; Physics; Applied Physics; Computational Biology and Bioinformatics*)

Associate Director

Emma Carley

Executive Committee Julien Berro (*Molecular Biophysics and Biochemistry; Cell Biology*), Joerg Bewersdorf (*Cell Biology; Biomedical Engineering*), Enrique De La Cruz (*Molecular Biophysics and Biochemistry*), Thierry Emonet (*Molecular, Cellular, and Developmental Biology; Physics; Computational Biology and Bioinformatics*), Jonathon Howard (*Molecular Biophysics and Biochemistry; Physics*), Megan King (*Cell Biology*), Andre Levchenko (*Biomedical Engineering*), Kathryn Miller-Jensen (*Biomedical Engineering; Molecular, Cellular, and Developmental Biology*), Simon Mochrie (*Physics; Applied Physics*), Michael Murrell (*Biomedical Engineering*), Corey O'Hern (*Mechanical Engineering and Materials Science; Physics; Applied Physics; Computational Biology and Bioinformatics*), Thomas Pollard (*Emeritus; Molecular, Cellular, and Developmental Biology*)

The Yale PEB program brings together faculty from the physical, engineering, and biological sciences, who carry out collaborative, interdisciplinary research and teaching. Participation in the PEB program is open to any graduate student who is interested in applying quantitative, physical approaches to study important biological questions. PEB-participating departments, tracks (BBS), and degree-granting programs include Applied Mathematics; Applied Physics; Biochemistry, Quantitative Biology, Biophysics, and Structural Biology (BBS track); Biomedical Engineering; Chemical and Environmental Engineering; Chemistry; Computational Biology and Bioinformatics (BBS track and also degree-granting program); Mechanical Engineering and Materials Science; Molecular Cell Biology, Genetics, and Development (BBS track); Molecular Medicine, Pharmacology, and Physiology (BBS track); Neuroscience (BBS track); Plant Molecular Biology (BBS track); and Physics.

GRADUATE CERTIFICATE IN PHYSICAL AND ENGINEERING BIOLOGY (PEB)

Upon completion of their Ph.D. in a home department, and satisfaction of the PEB curriculum, students receive a Certificate from the Integrated Graduate Program in Physical and Engineering Biology.

Students interested in participating in the PEB program may indicate their interest on their graduate application for admission to a home department or track. Students may also join the PEB after they have matriculated at Yale. After arriving at Yale, students

should e-mail peb@yale.edu to express their interest in the PEB, and the leadership will review their application materials.

PEB students acquire a depth of knowledge in their home department and also a breadth of knowledge across disciplines from PEB courses and activities. They will become skilled at applying physical and engineering methods and quantitative reasoning to biological problems, and at identifying and tackling cutting-edge problems in the life sciences, and they will be proficient at combining theory and computation with wet lab experiments. In addition, students will become comfortable working in an interdisciplinary and collaborative research environment and adept at communicating with scientists from a variety of disciplines as well as with nonscientists.

PEB CURRICULUM

The PEB curriculum consists of four core courses (see below), which all students, regardless of their undergraduate background, take together. The Integrated Workshop course (MB&B 591/ENAS 991/MCDB 591/PHYS 991) and the Methods and Logic in Interdisciplinary Research course (MB&B 517/ENAS 517/MCDB 517/PHYS 517) are typically taken in the first year. The third course, Biological Physics (ENAS 541/CB&B 523/MB&B 523/PHYS 523), and the fourth course, Modeling Biological Systems II (MCDB 562/AMTH 765/CB&B 562/ENAS 561/INP 562/MB&B 562/PHYS 562), should be completed by the end of the second year. With permission of the PEB leadership, one of the following courses may be substituted to satisfy the third or fourth course of the PEB requirement: Modeling Biological Systems I (MCDB 330); Neuromuscular Biomechanics (ENAS 559); Systems Biology of Cell Signaling (ENAS 567); Biomedical Data Science: Mining and Modeling (MB&B 752/CB&B 752/CPSC 752/MCDB 752); Genomic Methods for Genetic Analysis (GENE 760).

Two primer courses are also offered (but not required). Boot Camp Biology (MB&B 520) is a primer course for students entering PEB with little or no background in biology, and Quantitative Approaches in Biophysics and Biochemistry (MB&B 635/ENAS 518) is a primer course for students entering PEB with little or no background in mathematics and computation.

In addition to the formal courses, there are a multitude of enrichment activities available to PEB students; see <http://peb.yale.edu>.