BIOPHYSICS PROGRAM

Emeritus: Harden M. McConnell (Chemistry)
Director: William I. Weis
Professors: Richard W. Aldrich (Molecular and Cellular Physiology), Steve Block (Applied Physics), Steven Boxer (Chemistry), Axel Brunger (Molecular and Cellular Physiology), Douglas Brutlag (Biochemistry), Gilbert Chu (Oncology), Steven Chu (Physics, Applied Physics), Mark Davis (Microbiology and Immunology), Sebastian Doniach (Physics, Applied Physics), James Ferrell (Molecular Pharmacology), Philip C. Hanawalt (Biological Sciences), Daniel Herschlag (Biochemistry), Keith O. Hodgson (Chemistry), Wray H. Huestis (Chemistry), Chaitan Khosla (Chemical Engineering), Eric Kool (Chemistry), Ron Kopito (Biological Sciences), Roger D. Kornberg (Structural Biology), Michael Levitt (Structural Biology), David B. McKay (Structural Biology), Uel J. McMahan (Neurobiology), W. E. Moerner (Chemistry), Norbert Pelc (Radiology), Ed Solomon (Chemistry), James A. Spudich (Biochemistry, Developmental Biology), James Swartz (Chemical Engineering), William I. Weis (Structural Biology), Helmut Wiedemann (SSRL, Applied Physics)
Associate Professors: Russ Altman (Medical Informatics, General Medicine), Peter Jackson (Pathology), Tobias Meyer (Molecular Pharmacology), Jody Puglisi (Structural Biology)
Assistant Professors: Judith Frydman (Biological Sciences), K. Christopher Garcia (Microbiology and Immunology), Miriam Goodman (Molecular and Cellular Physiology), Pehr Harbury (Biochemistry), Merritt Maduke (Molecular and Cellular Physiology), Vijay Pande (Chemistry), Mark Schnitzer (Biological Sciences, Applied Physics), Julie Theriot (Biochemistry)

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Courses given in Biophysics have the subject code BIOPHYS. For a complete list of subject codes, see Appendix B.

The Biophysics Program offers instruction and research opportunities leading to the Ph.D. in Biophysics. Students admitted to the program may perform their graduate research in any appropriate department.

GRADUATE PROGRAM

For information on the University's basic requirements for the Ph.D. degree, see the "Graduate Degrees" section of this bulletin.

A small number of highly qualified applicants are admitted to the program each year. Applicants should present strong undergraduate backgrounds in the physical sciences and mathematics. The graduate course program, beyond the stated requirements, is worked out for each student individually with the help of appropriate advisers from the Committee on Biophysics. The requirements and recommendations for the Ph.D. degree include:

1. Training in physics or chemistry equivalent to that of an undergraduate physics or chemistry major at Stanford.
2. Completion of the following courses (or their equivalents):
   a) BIOPHYS 250
   b) BIOC 200, 201
   c) CHEM 131, 171, 173, and 175
   d) SBIO 241 and 242
   e) MED 255
   f) Additional courses as required for the individually tailored program
3. Proficiency in one or more foreign languages and/or a computer language may be required at the discretion of the major professor.
4. Opportunities for teaching are available during the first nine quarters, at the discretion of the advising committee.
5. The student must prepare a dissertation proposal defining the research to be undertaken, including methods of procedure. This proposal should be submitted by Winter Quarter of the third year, and it must be approved by a committee of at least three members including the principal research adviser and at least one member from the Committee on Biophysics. The candidate must defend the dissertation proposal in an oral examination. The Dissertation Reading Committee normally evolves from the Dissertation Proposal Review Committee.
6. The student must present a Ph.D. dissertation as the result of independent investigation and expressing a contribution to knowledge in the field of biophysics.
7. The student must pass the University oral examination, taken only after the student has substantially completed the research. The examination is preceded by a public seminar in which the research is presented by the candidate.

COURSES

BIOPHYS 205. DNA Repair and Genomic Stability—(Enroll in BIOSCI 205.)
3 units, Spr (Hanawalt, Ford)

BIOPHYS 210. Advanced Topics in Membrane Biochemistry—(Enroll in BIOC 210.)
4 units, Aut (Pfeffer) not given 20003-04

BIOPHYS 210A. Molecular Physiology of Cells—(Enroll in MCP 256.)
4 units, Spr (Lewis, Goodman)

BIOPHYS 211. Biophysics of Sensory Transduction—(Enroll in BIOSCI 211.)
4 units, Spr (S. Block)

BIOPHYS 228. Computational Structural Biology—(Same as SBIO 228.) Interatomic forces and interactions such as electrostatics and hydrophobicity, and protein structure in terms of amino acid properties, local chain conformation, secondary structure, domains, and families of folds. How protein motion can be simulated. Bioinformatics in terms of methods that compare protein via their amino acid sequences and their three-dimensional structures. Structure prediction via simple comparative modeling. How remote homologues can be detected and modeled. Predicting the structure of a protein from knowledge of its amino acid sequence.
3 units, Win (Levitt)

BIOPHYS 241. Biological Macromolecules—(Enroll in SBIO 241.)
3-5 units, Aut (Puglisi, Block, Herschlag, Kirkegaard, McKay)

BIOPHYS 242. Methods in Molecular Biophysics—(Enroll in BIOCHEM 242, SBIO 242.)
3 units (McKay, Puglisi) alternate years, given 2004-05

BIOPHYS 250. Seminar in Biophysics—All graduate students in Biophysics must participate. Presentation of current research projects and results by all faculty in the Biophysics Program.
1 unit, Aut, Win (Staff)

BIOPHYS 255. The Responsible Conduct of Research—A forum for scientists to familiarize themselves with institutional policies/practices and professional standards that define scientific integrity. Overview of ethics in research, authorship, patents, and human interest at the academic-commercial interface, and small group sessions for more extended discourse between students and faculty. Completion fulfills NIH/ADAMHA requirement for instruction in the ethical conduct of research. Required course for incoming students.
1 unit, Win (Staff)

BIOPHYS 297. Bio-Inorganic Chemistry—(Same as CHEM 297.) Overview of metal sites in biology. Metalloproteins as elaborated inorganic complexes, their basic coordination chemistry and bonding, unique

features of the protein ligand, and the physical methods used to study active sites. Active site structures are correlated with function. Prerequisites: 153 and 173, or equivalents.

3 units (Solomon) not given 2003-04

BIOPHYS 300. Research

1-18 units, Aut, Win, Spr, Sum (Staff)

BIOPHYS 399. Directed Reading

1-18 units, by arrangement (Staff)

BIOPHYS 450. Introduction to Biotechnology—(Enroll in CHEMENG 450, BIOC 450.)

3 units, Spr (Kao)

BIOPHYS 459. Frontiers in Interdisciplinary Biosciences—(Cross-listed in multiple departments in the schools of Humanities and Sciences, Engineering, and Medicine. Students should enroll through their affiliated department; otherwise enroll in CHEMENG 459.) See CHEMENG 459 or http://biox.stanford.edu/chemeng_index.html for description.

1 unit, Aut, Win, Spr (Robertson)