Biophysics


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.

The Stanford Biophysics Program is an interdisciplinary, interdepartmental training program leading to the Ph.D. Degree in biophysics. The program centers on understanding biological function in terms of physical and chemical principles. The Program comprises faculty from 16 departments in the Schools of Humanities and Sciences, Medicine, Engineering, and the Stanford Synchrotron Radiation Laboratory. Research in the Program involves two overlapping branches of biophysics: the application of physical and chemical principles and methods to solving biological problems, and the development of new methods.

The Biophysics Program aims to train students in quantitative approaches to biological problems, while also developing their perspective in choosing forefront biological problems. A balanced academic program is tailored to the diverse backgrounds of the students. The program requires graduate-level coursework in physical and biological sciences, participation in seminar series, and most importantly achievement of a high level of proficiency in independent research.

Learning Outcomes (Graduate)

The Ph.D. is conferred upon candidates who have demonstrated substantial scholarship and the ability to conduct independent research and analysis in Biophysics. Through completion of advanced course work and rigorous skills training, the doctoral program prepares students to make original contributions to the knowledge of Biophysics and to interpret and present the results of such research.

Graduate Program in Biophysics

For more information on the University’s basic requirements for the Ph.D. degree, see the "Graduate Degrees (http://www.stanford.edu/dept/registrar/bulletin/4901.html)" section of this bulletin.

A small number of 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 a major with connections to biophysics such as physics, chemistry, or biology, with a quantitative background equivalent to that of an undergraduate physics or chemistry major at Stanford.

2. Completion of the following background courses or their equivalents at other institutions:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 131</td>
<td>Organic Polyfunctional Compounds</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 171</td>
<td>Physical Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 173</td>
<td>Physical Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 175</td>
<td>Physical Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>BIOC 200</td>
<td>Applied Biochemistry</td>
<td>1</td>
</tr>
</tbody>
</table>

3. Completion of the following courses or their equivalents:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOPHYS 241</td>
<td>Biological Macromolecules</td>
<td>3</td>
</tr>
<tr>
<td>BIOPHYS 250</td>
<td>Seminar in Biophysics</td>
<td>1</td>
</tr>
<tr>
<td>BIOE 300A &amp; BIOPHYS 242</td>
<td>Molecular and Cellular Bioengineering and Methods in Molecular Biophysics</td>
<td>3</td>
</tr>
<tr>
<td>MED 255</td>
<td>The Responsible Conduct of Research</td>
<td>1</td>
</tr>
</tbody>
</table>

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 Biophysics Program. 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 that expresses a contribution to knowledge in the field of biophysics.

7. The student must pass the University oral exam, taken only after the student has substantially completed the dissertation research. The examination is preceded by a public seminar in which the research is presented by the candidate.

Emeritus: Harden M. McConnell (Chemistry)
Director: Vijay Pande (Chemistry)

Professors: Russ Altman (Genetics, Medical Informatics), Steve Block (Applied Physics, Biology), Steven Boxer (Chemistry), Axel Brunger (Molecular and Cellular Physiology), Gilbert Chu (Oncology), Mark Davis (Microbiology and Immunology), Sebastian Doniach (Physics, Applied Physics), James Ferrell (Chemical and Systems Biology), Daniel Fisher (Applied Physics), Judith Frydman (Biology), K. Christopher Garcia (Molecular and Cellular Physiology, Structural Biology), Daniel Glover (Radiology), Philip C. Hanawalt (Biology), Daniel Herschlag (Biochemistry), Keith O. Hodgson (Chemistry), Theodore Jardetzky (Structural Biology), Chaitan Khosla (Chemical Engineering, Chemistry), Brian Kobilka (Molecular and Cellular Physiology), Eric Kool (Chemistry), Ron Kopito (Biology), Roger D. Kornberg (Structural Biology), Craig Levin (Radiology), Michael Levitt (Structural Biology), Richard Lewis (Molecular and Cellular Physiology), Sharon Long (Biology), Tobias Meyer (Chemical and Systems Biology), W. E. Moerner (Chemistry), Vijay Pande (Chemistry), Norbert Pec (Bioengineering, Radiology), Joseph D. Puglisi (Structural Biology), Stephen Quake (Bioengineering), Stephen J. Smith (Molecular and Cellular Physiology), Edward I. Solomon (Chemistry), James A. Spudich (Biochemistry, Developmental Biology),
William I. Weis (Structural Biology, Molecular and Cellular Physiology),
Richard N. Zare (Chemistry)

Associate Professors: Annelise Barron (Bioengineering), Miriam Goodman
(Molecular and Cellular Physiology), Pehr Harbury (Biochemistry), Merritt
Maduke (Molecular and Cellular Physiology), Jianghong Rao (Radiology),
Mark Schnitzer (Biology, Applied Physics), Julie Theriot (Biochemistry)

Assistant Professors: Zev Bryant (Bioengineering), Lynette Cegelski
(Chemistry), Jennifer Cochran (Bioengineering), Bianxiao Cui (Chemistry),
Rhiju Das (Biochemistry), Adam de la Zerda (Structural Biology),
Alexander Dunn (Chemical Engineering), William Greenleaf (Genetics),
KC Huang (Bioengineering), Ingmar Riedel-Kruse (Bioengineering), Jan
Skotheim (Biology), Andrew Spakowitz (Chemical Engineering), Mary
Teruel (Chemical and Systems Biology).