

# BIOPHYSICS

Courses offered by the Biophysics Program are listed under the subject code BIOPHYS on the Stanford Bulletin's ExploreCourses web site.

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 information on the University's basic requirements for the Ph.D. degree, see the "Graduate Degrees (<http://exploreddegrees.stanford.edu/graduatedegrees>)" 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 applying to the Ph.D. Program in Biophysics include:

		Units
CHEM 131	Organic Polyfunctional Compounds	3
CHEM 171	Physical Chemistry I	4
CHEM 173	Physical Chemistry II	3
CHEM 175	Physical Chemistry III	3
BIOC 200	Applied Biochemistry	2

Ph.D. students in the Program in Biophysics are required to complete the following course requirements:

		Units
BIOPHYS 241 or BIOC 300A	Biological Macromolecules Molecular and Cellular Bioengineering	3-5

BIOPHYS 242	Methods in Molecular Biophysics (offered every other year)	3
BIOPHYS 250	Seminar in Biophysics	1
MED 255	The Responsible Conduct of Research	1
and 4 graduate-level courses in physical or biological science, with		
at least 1 course in physical science		
at least 1 course in literature-based biological science		

## Degree Progress Outline

### First Year

#### Courses & Research

##### Rotations (Autumn, Winter, and Spring, if necessary)

1. Students must begin working on their first rotation prior to arriving or starting Autumn Quarter on campus; students must contact their faculty of interest in Summer Quarter.
2. Students should contact Amy Lin <[amblin@stanford.edu](mailto:amblin@stanford.edu)> or Kathleen Guan <[kguan@stanford.edu](mailto:kguan@stanford.edu)> in the student services office when they rotate in a new lab in Autumn and Winter quarters, or Spring quarter if they do a third rotation.

##### Thesis Lab (Spring or Summer)

1. Students should contact Amy Lin <[amblin@stanford.edu](mailto:amblin@stanford.edu)> or Kathleen Guan <[kguan@stanford.edu](mailto:kguan@stanford.edu)> in the student services office when they decide on a research lab. If the adviser is not a Biophysics faculty, students must have a Biophysics faculty member as co-adviser on the reading committee. Note that the "reading committee" (administrative/faculty term) is the "thesis committee" (Biosciences term) as well as the "dissertation reading committee" (University term).

##### Individual Development Plan (IDP) (<https://biosciences.stanford.edu/current/idp>)

In light of the benefits to trainee development and the likelihood that the IDP program will be a factor in NIH funding decisions, the Committee on Graduate Admissions and Policy (CGAP) has adopted a new policy ([https://biosciences.stanford.edu/current/idp/docs/Official\\_IDP\\_Announcement\\_Memo.pdf](https://biosciences.stanford.edu/current/idp/docs/Official_IDP_Announcement_Memo.pdf)) requiring all Biosciences PhD candidates and their mentors in the Schools of Medicine and H&S to create and discuss the IDP on an annual basis.

1. Complete the first IDP meeting with the adviser within 30 days of joining the thesis lab.
2. IDP meetings are required annually, in addition to and separate from thesis committee meetings (see below).
3. Students are responsible to update their record in Graduate Student Tracking (GST) (<https://med.stanford.edu/gst>).

### Second Year

#### Courses & Research

##### Reading Committee Form

1. Students must form their reading committee and prepare for the qualifying exam.
2. Students should contact Amy Lin <[amblin@stanford.edu](mailto:amblin@stanford.edu)> or Kathleen Guan <[kguan@stanford.edu](mailto:kguan@stanford.edu)> in the student services office when the qualifying exam date has been set to get the Qualifying Exam form.

##### Individual Development Plan (IDP) (<https://biosciences.stanford.edu/current/idp>)

Students must download and fill out the appropriate form (<https://biosciences.stanford.edu/current/idp/forms.html>), and use it to guide their annual planning/mentoring meeting.

**Third Year****Courses & Research****Qualifying Exam**

1. The qualifying exam should be completed no later than Autumn Quarter of your third year.
2. Students submit the Qual Exam Form (pdf) (<https://author.medweb.stanford.edu/content/dam/sm/biophysics/documents/forms/Qual-Exam-Form.pdf>) to Amy Lin <amblin@stanford.edu> or Kathleen Guan <kguan@stanford.edu> in the student services office.
3. Students must review and be aware of Biosciences regulations for the qualifying exam (<https://author.medweb.stanford.edu/content/dam/sm/biophysics/documents/forms/Qual-exam-regulations-2017.pdf>).

**Reading Committee Form**

1. Students must submit the Reading Committee Form (pdf) (<https://author.medweb.stanford.edu/content/dam/sm/biophysics/documents/forms/Dissertation-Reading-Committee-Form.pdf>), signed by all committee members and the director, to Kathleen/Amy.

**Candidacy Form**

1. Submit your Candidacy Form (<https://author.medweb.stanford.edu/content/dam/sm/biophysics/documents/forms/Candidacy-Form.pdf>), signed by you, your advisor and the director, with list of all required courses completed (see above) to Amy Lin <amblin@stanford.edu> or Kathleen Guan <kguan@stanford.edu> in the student services office.

Thesis Committee Meetings (TCM) (<https://biosciences.stanford.edu/current/curriculum/committee-meetings.html>)

Students are required to meet with the advisory committee once a year in third & fourth years, and twice for fifth years and above.

1. The qualifying exam is considered the first thesis committee meeting.
2. Students must submit the TCM forms (pdf) (<https://author.medweb.stanford.edu/content/dam/sm/biophysics/documents/forms/TCM-Form-2016.pdf>) to Amy Lin <amblin@stanford.edu> or Kathleen Guan <kguan@stanford.edu> in the student services office.
3. Students are responsible to update their record in Graduate Student Tracking (GST) (<https://med.stanford.edu/gst>).

**Individual Development Plan ( IDP (<https://biosciences.stanford.edu/current/idp>))**

Students must download and fill out the appropriate form (<https://biosciences.stanford.edu/current/idp/forms.html>), and use it to guide their annual planning/mentoring meeting.

**Fourth Year****Courses & Research****Terminal Graduate Registration ( TGR (<https://registrar.stanford.edu/students/graduate-degree-progress/terminal-graduate-registration-tgr-status>))**

Students must meet with Kathleen Guan <kguan@stanford.edu> in the student services office and submit their TGR Form (pdf) (<https://author.medweb.stanford.edu/content/dam/sm/biophysics/documents/forms/TGR-Form.pdf>) once they reach 135 units.

**Thesis Committee Meetings ( TCM (<https://biosciences.stanford.edu/current/curriculum/committee-meetings.html>))**

Students are required to meet with the advisory committee once a year in the fourth year.

**Individual Development Plan ( IDP (<https://biosciences.stanford.edu/current/idp>))**

Students must download and fill out the appropriate form (<https://biosciences.stanford.edu/current/idp/forms.html>), and use it to guide their annual planning/mentoring meeting.

**Fifth Year & Above Courses & Research**

Students must ensure that they have correctly enrolled in TGR.

**Defense**

1. Students meet with Kathleen Guan <kguan@stanford.edu> in the student services office when they have their defense committee in place.
2. Students must take their University oral examination with the defense committee.
3. Students must submit the thesis to the University.

**Thesis Committee Meetings ( TCM (<https://biosciences.stanford.edu/current/curriculum/committee-meetings.html>))**

Students must complete two required TCM meetings annually with the reading committee in the fifth and subsequent years.

**Individual Development Plan ( IDP (<https://biosciences.stanford.edu/current/idp>))**

Students must download and fill out the appropriate form (<https://biosciences.stanford.edu/current/idp/forms.html>), and use it to guide their annual planning/mentoring meeting.

**Additional Information**

1. TA-ship is optional, and is not required by Biophysics. Students who express interest work with faculty and course instructor to make arrangements.
2. See the Biophysics web site (<http://med.stanford.edu/biophysics.html>) for additional information.

**Emeritus:**

- Harden M. McConnell (Chemistry)
- Stephen J. Smith (Molecular & Cellular Physiology)

**Director:**

- KC Huang (Bioengineering)

**Professors:**

- Russ Altman (Bioengineering, Genetics, Medicine - Biomedical Informatics)
- Steve M. Block (Applied Physics, Biology)
- Steven Boxer (Chemistry)
- Axel Brunger (Molecular & Cellular Physiology)
- Wah Chiu (Bioengineering)
- Gilbert Chu (Oncology, Biochemistry)
- Steven Chu (Physics, Molecular & Cellular Physiology)
- John O. Dabiri (Civil and Environmental Engineering, Mechanical Engineering)
- Hongjie Dai (Chemistry)
- Mark Davis (Microbiology & Immunology)
- Sebastian Doniach (Physics, Applied Physics)
- James Ferrell (Chemical & Systems Biology, Biochemistry)
- Daniel Fisher (Applied Physics)
- Judith Frydman (Biology, Genetics)
- Chris Garcia (Molecular & Cellular Physiology, Structural Biology)
- Gary H. Glover (Radiology)
- Miriam Goodman (Molecular & Cellular Physiology)

- Philip C. Hanawalt (Biology, Dermatology)
- Daniel Herschlag (Biochemistry)
- Keith O. Hodgson (Chemistry)
- Theodore Jardetzky (Structural Biology)
- Peter S. Kim (Biochemistry)
- Brian Kobilka (Molecular & Cellular Physiology)
- Eric Kool (Chemistry)
- Ron Kopito (Biology)
- Roger D. Kornberg (Structural Biology)
- Craig Levin (Radiology)
- Michael Levitt (Structural Biology)
- Richard Lewis (Molecular & Cellular Physiology)
- Sharon Long (Biology)
- Tobias Meyer (Chemical & Systems Biology)
- W. E. Moerner (Chemistry)
- Vijay Pande (Chemistry)
- Norbert Pelc (Bioengineering, Radiology)
- Joseph D. Puglisi (Structural Biology)
- Stephen Quake (Bioengineering, Applied Physics)
- Jianghong Rao (Radiology)
- Edward I. Solomon (Chemistry)
- James A. Spudich (Biochemistry)
- Julie Theriot (Biochemistry, Microbiology & Immunology)
- Alice Y. Ting (Genetics)
- Thomas Wandless (Chemical & Systems Biology)
- William I. Weis (Structural Biology, Molecular & Cellular Physiology)
- Richard Zare (Chemistry)
- Anshul Kundaje (Genetics, Computer Science)
- Jin Billy Li (Genetics)
- Lingyin Li (Biochemistry)
- Manu Prakash (Bioengineering)
- Ingmar H. Riedel-Kruse (Bioengineering)
- Julia Salzman (Biochemistry)
- Sindy Tang (Mechanical Engineering)
- Mary Teruel (Chemical & Systems Biology)
- Bo Wang (Bioengineering)

*Associate Professors:*

- Annelise Barron (Bioengineering)
- Zev Bryant (Bioengineering)
- Jennifer Cochran (Bioengineering)
- Bianxiao Cui (Chemistry)
- Rhiju Das (Biochemistry)
- Ron Dror (Computer Science)
- Alexander Dunn (Chemical Engineering)
- William Greenleaf (Genetics)
- Pehr Harbury (Biochemistry)
- KC Huang (Bioengineering)
- Jan Liphardt (Bioengineering)
- Merritt Maduke (Molecular & Cellular Physiology)
- Beth Pruitt (Mechanical Engineering)
- Mark Schnitzer (Biology, Applied Physics)
- Jan Skotheim (Biology)
- Andrew Spakowitz (Chemical Engineering)

*Assistant Professors:*

- Raag Airan (Radiology)
- Lacramioara Bintu (Bioengineering)
- Alistair Boettiger (Developmental Biology)
- Onn Brandman (Biochemistry)
- Lynette Cegelski (Chemistry)
- Ovijit Chaudhuri (Mechanical Engineering)
- Adam de la Zerda (Structural Biology)
- Liang Feng (Molecular & Cellular Physiology)
- Polly Fordyce (Genetics)
- Possu Huang (Bioengineering)