

STRUCTURAL BIOLOGY

Courses offered by the Department of Structural Biology are listed under the subject code SBIO on the (<http://explorecourses.stanford.edu/CourseSearch/search/?view=catalog&catalog=&page=0&q=SBIO&filter-catalognumber-SBIO=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search/?view=catalog&catalog=&page=0&q=SBIO&filter-catalognumber-SBIO=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search/?view=catalog&catalog=&page=0&q=SBIO&filter-catalognumber-SBIO=on>).

The department offers course work and opportunities for research in structural biology.

The emphasis of research in the department is on understanding fundamental cellular processes in terms of the structure and function of biological macromolecules and their assemblies. Techniques used include standard methods of biochemistry, cell culture, single-molecule fluorescence spectroscopy, genetic engineering, and three dimensional structure determination by x-ray diffraction, nuclear magnetic resonance spectroscopy and electron microscopy, coupled with the development of computational methods.

Doctor of Philosophy in Structural Biology

Admission

Applicants to the program should have a bachelor's degree and should have completed at least a year of coursework in biology, mathematics, organic chemistry, physical chemistry, and physics. Applications must be received by the department before December 15 for notification by April 15. Application to the National Science Foundation for fellowship support is also encouraged. Prospective applicants should contact the Department of Structural Biology for further information. GRE general score is optional and GRE subject score is not required.

The recommendations for applying to the Ph.D. program in the Department of Structural Biology include:

		Units
CHEM 123	Organic Polyfunctional Compounds	3
CHEM 171	Foundations of Physical Chemistry	4
CHEM 173	Physical Chemistry II	3
CHEM 175	Physical Chemistry III	3
BIOC 200	Applied Biochemistry	2

Graduate Studies:

Ph.D. students in the Department of Structural Biology are required to complete all the following requirements:

		Units
BIOS 200	Foundations in Experimental Biology	5
SBIO 241	Biological Macromolecules	3-5
or BIOE 300A	Molecular and Cellular Bioengineering	
SBIO 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, at least 3 additional 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		

1. The graduate program is intended to prepare students for careers as independent investigators in cell and molecular biology. The

principal requirement of a Ph.D. degree is the completion of research constituting an original and significant contribution to the advancement of knowledge. It is a training in a major with connections to biophysics (e.g., physics, chemistry, or biology, with a quantitative background equivalent to that of an undergraduate physics or chemistry major at Stanford).

2. Opportunities for teaching are available during the first nine quarters at the discretion of the advising committee.
3. The student must prepare a dissertation proposal defining the research to be undertaken including methods of procedure. This proposal should be submitted by the end of summer quarter of the second 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 Department of Structural Biology. The candidate must defend the dissertation proposal in an oral examination. The dissertation reading committee normally evolves from the dissertation proposal review committee.
4. The student must present a Ph.D. dissertation as the result of independent investigation and expressing a contribution to knowledge in the field of structural biology.
5. 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.

Current topics of research in the department lie in the areas of gene expression; theoretical, crystallographic, and genetic analysis of protein structure; and cell-cell interaction. See Stanford's School of Medicine (<http://www.med.stanford.edu/school/structuralbio/>) web site for further information.

COVID-19 Policies

On July 30, the Academic Senate adopted grading policies effective for all undergraduate and graduate programs, excepting the professional Graduate School of Business, School of Law, and the School of Medicine M.D. Program. For a complete list of those and other academic policies relating to the pandemic, see the "COVID-19 and Academic Continuity (<http://exploreddegrees.stanford.edu/covid-19-policy-changes/#tempdeptemplatetabtext>)" section of this bulletin.

The Senate decided that all undergraduate and graduate courses offered for a letter grade must also offer students the option of taking the course for a "credit" or "no credit" grade and recommended that deans, departments, and programs consider adopting local policies to count courses taken for a "credit" or "satisfactory" grade toward the fulfillment of degree-program requirements and/or alter program requirements as appropriate.

Graduate Degree Requirements

Grading

The Department of Structural Biology counts all courses taken in academic year 2020-21 with a grade of 'CR' (credit) or 'S' (satisfactory) towards satisfaction of graduate degree requirements that otherwise require a letter grade provided that the instructor affirms that the work was done at a 'B-' or better level.

Graduate Advising Expectations

The Department of Structural Biology is committed to providing academic advising in support of graduate student scholarly and professional development. When most effective, this advising relationship entails collaborative and sustained engagement by both the adviser and the advisee. As a best practice, advising expectations should be periodically discussed and reviewed to ensure mutual understanding. Both the

adviser and the advisee are expected to maintain professionalism and integrity.

Faculty advisers guide students in key areas such as selecting courses, designing and conducting research, developing of teaching pedagogy, navigating policies and degree requirements, and exploring academic opportunities and professional pathways.

Graduate students are active contributors to the advising relationship, proactively seeking academic and professional guidance and taking responsibility for informing themselves of policies and degree requirements for their graduate program.

For a statement of University policy on graduate advising, see the "Graduate Advising (<http://exploreddegrees.stanford.edu/graduatedegrees/#advisingandcredentialstext>)" section of this bulletin.

Chair: William I. Weis

Associate Chair: Michael Levitt

Director of Graduate Studies: Theodore Jardetzky

Professors:

- K. Christopher Garcia
- Theodore Jardetzky
- Roger D. Kornberg
- Michael Levitt
- Peter Parham
- Joseph D. Puglisi
- Georgios Skiniotis
- Soichi Wakatsuki
- William I. Weis

Associate Professor (Research):

- Yahli Lorch

Assistant Professor (Research):

- Elizabetta Viani Puglisi

Associate Professor:

- Adam de la Zerda

Courtesy Professor:

- Axel Brunger
- Vijay Pande

Courtesy Associate Professor:

- Zev Bryant

Courses

SBIO 199. Undergraduate Research. 1-18 Unit.

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

SBIO 225. Biochips and Medical Imaging. 3 Units.

The course covers state-of-the-art and emerging bio-sensors, bio-chips, imaging modalities, and nano-therapies which will be studied in the context of human physiology including the nervous system, circulatory system and immune system. Medical diagnostics will be divided into bio-chips (in-vitro diagnostics) and medical and molecular imaging (in-vivo imaging). In-depth discussion on cancer and cardiovascular diseases and the role of diagnostics and nano-therapies.

Same as: EE 225, MATSCI 225

SBIO 241. Biological Macromolecules. 3-5 Units.

The physical and chemical basis of macromolecular function. Topics include: forces that stabilize macromolecular structure and their complexes; thermodynamics and statistical mechanics of macromolecular folding, binding, and allostery; diffusional processes; kinetics of enzymatic processes; the relationship of these principles to practical application in experimental design and interpretation. The class emphasizes interactive learning, and is divided among lectures, in-class group problem solving, and discussion of current and classical literature. Enrollment limited to 30. Prerequisites: Background in biochemistry and physical chemistry recommended but material available for those with deficiency in these areas; undergraduates with consent of instructor only. Same as: BIOC 241, BIOE 241, BIOPHYS 241

SBIO 242. Methods in Molecular Biophysics. 3 Units.

Experimental methods in molecular biophysics from theoretical and practical standpoints. Emphasis is on X-ray diffraction, electron microscopy, nuclear magnetic resonance, and fluorescence spectroscopy. Prerequisite: physical chemistry or consent of instructor. Same as: BIOPHYS 242

SBIO 251. Biotechnology in the Natural World. 1 Unit.

Life can be found in some of the strangest and most inhospitable places of Earth. Whether in hot springs, oceanic depths, or dense rainforests, living organisms must be natural specialists to survive. This course explores a selection of strange and ingenious biomolecules that natural organisms have evolved in order to survive. Lectures will cover historical background as well as detailed investigations of the structure and function of selected biomolecules of interest. The majority of each lecture and discussion will focus on the adaptation of those molecules for fundamental and innovative approaches in modern biotechnology, especially in medicine and biophotonics. Key biophysical and biochemical techniques will be discussed as they are encountered within primary literature.

Same as: BIOS 251

SBIO 280. Curricular Practical Training. 1 Unit.

CPT Course required for international students completing degree requirements.

SBIO 299. Directed Reading in Structural Biology. 1-18 Unit.

Prerequisite: consent of instructor.

SBIO 370. Medical Scholars Research. 4-18 Units.

Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

SBIO 399. Graduate Research. 1-18 Unit.

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

SBIO 801. TGR Project. 0 Units.

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SBIO 802. TGR Dissertation. 0 Units.

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