Department of Biochemistry

Graduate Student Handbook 2023-24

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Faculty

Emeritus Professors: Patrick O. Brown, Douglas Brutlag, I. Robert Lehman, James A. Spudich

Chairman: Aaron Straight

Professors: Steven Artandi, Gilbert Chu, Ronald W. Davis, James E. Ferrell, Jr., Daniel Herschlag, Peter Kim, Mark A. Krasnow, Suzanne R. Pfeffer, Aaron Straight, Rhiju Das, Rajat Rohatgi

Associate Professors: Onn Brandman, Pehr Harbury, Lingyin Li, Julia Salzman

Assistant Professors: Alex Gao, Silvana Konermann, Florentine Rutaganira

Courtesy Professors: Karlene Cimprich, Chaitan Khosla, Sharon Long

Director of Graduate Studies: Onn Brandman

The Department of Biochemistry explores the molecular basis of life by studying the structures and functions of proteins and nucleic acids, the control of development, molecular motors and the cytoskeleton, trafficking of proteins between organelles, regulation of gene expression, protein homeostasis, structure and design, genetic and epigenetic control of chromosome function, and the application of genomics. These efforts have led to transformative advances in our understanding of health and disease. Advanced courses in more specialized areas emphasize the most recent developments in biochemistry, biophysics, cell biology, and molecular biology. These courses include the physical chemistry of proteins and nucleic acids, membrane biology and biochemistry, the cytoskeleton, mechanisms and regulation of nucleic acid replication and recombination, the biochemistry of bacterial and animal viruses, the molecular basis of morphogenesis, and the structure and function of both eukaryotic and prokaryotic chromosomes. Laboratories are located throughout the Stanford campus and affiliated institutes.

COURSES

199. Undergraduate Research—Investigations sponsored by individual faculty members. Prerequisite: consent of instructor.
1-18 units, Aut, Win, Spr, Sum (Staff)

200. Applied Biochemistry–(Enrollment limited to MD candidates) Fundamental concepts of biochemistry as applied to clinical medicine. Topics include vitamins and cofactors, metabolism of carbohydrates, lipids, amino acids and nucleotides, and the integration of metabolic pathways. Clinical case studies discussed in small-group, problem-based learning sessions.
2 units, Aut (Harbury, Cowan)

202. Biochemistry Mini-Course—(Open to first year Biochemistry students or consent of instructor) Hands-on, four or five-day immersion in biochemical methods and practice, theory and application of light microscopy, nucleic acid sequencing, and computational approaches to modern biological problems.
1 unit, Aut (Brandman)

205. Molecular Foundations of Medicine—(For medical students) Topics include DNA structure, replication, repair, and recombination; gene expression, including mechanisms for regulating transcription and translation; chromosome structure and function; gene cloning, protein engineering, and genomics. Patient presentations and journal clubs illustrate how molecular biology affects the practice of medicine.
3 units, Aut (Chu, Gomez-Ospina)

215. Frontiers in Biological Research—(Same as DBIO 215, GENE 215) Literature discussion in conjunction with the Frontiers in Biological Research seminar series hosted by Biochemistry, Developmental Biology, and Genetics in which distinguished investigators present current work. Students and faculty meet beforehand to discuss papers from the speaker's primary research literature. Students meet with the speaker after the seminar to discuss their research and future direction, commonly used techniques to study problems in biology, and comparison between the genetic and biochemical approaches in biological research.
1 unit, Aut, Win (Harbury, Villeneuve, Pringle)

221. The Teaching of Biochemistry—Required for teaching assistants in Biochemistry. Practical experience in teaching on a one-to-one basis, and problem set design and analysis. Familiarization with current lecture and text materials; evaluations of class papers and examinations. Prerequisite: enrollment in the Biochemistry Ph.D. program or consent of instructor. 3 units, Aut, Win, Spr, Sum (Staff)

224. Advanced Cell Biology—(Same as BIO 214, MCP 221) For PhD students. Current

research on cell structure, function, and dynamics. Topics include complex cell phenomena such as cell division, apoptosis, compartmentalization, transport and trafficking, motility and adhesion, differentiation, and multicellularity. Current papers from the primary literature. Prerequisite for undergraduates: BIO 129A,B, and consent of instructor.
3 units, Win (Pfeffer, Ehrhardt, Jarosz, Kopito, Svensson)

241. Biological Macromolecules—(Same as BIOE 241, BIOPHYS 241, SBIO 241) The physical and chemical basis of macromolecular function. Forces that stabilize biopolymers with three-dimensional structures and their functional implications. Thermodynamics, molecular forces, structure and kinetics of enzymatic and diffusional processes, and relationship to their practical application in experimental design and interpretation. Biological function and the level of individual molecular interactions and at the level of complex processes. Case studies in lecture and discussion of classic and current literature. Enrollment limited to 30. Prerequisites: None; background in biochemistry and physical chemistry preferred but material available for those with deficiency; undergraduates with consent of instructor only.
3-5 units, Aut (Das)

257. Currents in Biochemistry—Seminars by Biochemistry faculty on their ongoing research. Background, current advances and retreats, general significance, and tactical and strategic research directions. 1 unit, Aut (Straight)

299. Directed Reading—Prerequisite: consent of instructor. 1-18
units, Aut, Win, Spr, Sum (Staff)

350. Development of Thesis Research–Biochemistry 2nd year PhD students with permission of instructor only. Students place their thesis research into a broader scientific perspective, identify important questions to ask, and learn to communicate these clearly. Series of roundtable discussions with students and faculty about the proposed research topics. Initial focus on developing the equivalent of specific aims for research grants. 2 units, Aut, (Harbury, Rohatgi)

360. Developing an Original Research Proposal–Biochemistry 3rd year PhD students with permission of instructor only. Students foster broad familiarity with the biomedical literature and learn to develop new research directions. Topics well outside of each student's research topic are chosen for regular informal journal club presentations. Students work with faculty to hone skills for identifying important open scientific questions, formulating hypotheses, and refining experimental logic. Students work collectively to create a "model" research proposal on a topic of general interest to the group, and then individually to develop an original proposal on a topic of each student's choice.
1 unit, Spr (Herschlag, Krasnow)

370. Medical Scholars Research–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. 4-18 units Aut, Win, Spr, Sum (Staff)

399. Graduate Research and Special Advanced Work—Investigations sponsored by individual faculty members. Prerequisite: consent of instructor.
1-18 units, Aut, Win, Spr, Sum (Staff)

459. Frontiers in Interdisciplinary Biosciences—(Same as BIOE 459, BIO 459, CHEMENG 459, CHEM 459, PSYCH 459. Students register through their affiliated department.) For specialists and non-specialists. Sponsored by the Stanford BioX Program. Three seminars per quarter address scientific and technical themes related to interdisciplinary approaches in bioengineering, medicine, and the chemical, physical, and biological sciences. Leading investigators from Stanford and the world present breakthroughs and endeavors that cut across core disciplines. Pre-seminars introduce basic concepts and background for non-experts. Registered students attend all pre-seminars; others welcome. See http://biox.stanford.edu/courses/459.html. Recommended: basic mathematics, biology, chemistry, and physics.
1 unit, Aut, Win, Spr (Robertson)

802. TGR Dissertation – Terminal Graduate Registration course for doctoral programs. Work on the thesis dissertation must be evaluated.
0 units, Aut, Win, Spr, Sum (Staff)

This information, together with the latest Stanford University time schedule, is also available through Axess at: http://axess.stanford.edu/

There are excellent graduate level courses taught by faculty in other departments in the Medical School as well as by faculty in Biology and Chemistry. These courses enhance the breadth and depth of graduate education, providing students with an understanding of the multidisciplinary nature of modern biochemistry. Students are also encouraged to come up with areas for courses, which can then be organized in conjunction with one or more members of the faculty.

DEPARTMENT REQUIREMENTS FOR THE Ph.D.

1. Timetable and requirements:

a. The first two or three quarters of a student's first year involve research rotations, which are typically one per quarter, but students sometimes opt for two shorter rotations per quarter. Rotations are set up by direct arrangement between the student and the appropriate faculty member. A thesis advisor can be selected as early as the end of the second quarter, which we promote in order to allow students to get started on their thesis project as soon as possible. A thesis advisor should ideally be selected no later than the end of the third quarter. If a student fails to secure a thesis lab by the end of summer quarter of the first year they will meet with the graduate advisor and progress toward the degree will be assessed.

b. A committee to review graduate student progress is formed as soon as the student chooses an advisor. In consultation with the advisor, the student chooses the committee, which consists of the advisor and two other Biochemistry Department faculty members. A faculty member from another department may serve as a member of the committee in addition to the advisor and the two Biochemistry faculty.

c. Students present two research proposals (the first on their proposed thesis research, the second on an outside area) and one Journal Club presentation. These are described in detail below.

d. Each year the student will also meet with their committee to review degree progress and goals. Beyond year 5, students will meet with their committee every quarter.

e. It is expected that the Ph.D. thesis and oral examination will be completed within five years. The student, the student's advisor, and the student's committee should work together to meet this goal. This policy is designed to encourage timely progress toward the degree and to protect the long-term interests of our students, as an extended graduate tenure impinges on the exploration and experience of new scientific areas and endeavors, the exposure to alternate scientific environments, approaches to science, and mentoring styles, and the opportunity for rapid advancement to an independent career in science and related fields. In the petition form, the student must: (i) describe the proposed plan and timeline to completion of the degree, and (ii) explain and justify the need for additional research and/or writing time. Extensions beyond G6 are expected to be granted only under exceptional, well-justified circumstances. If a student has completed all the requirements for the degree but needs to finish papers for journal submission, they should consider doing so following completion of the degree by continuing for a short period in the lab as a postdoctoral fellow.

f. The above requirements are set by the Biochemistry Department. There are also three University requirements: (i) a student must be admitted to candidacy for the Ph.D. degree no later than the end of the second year (see page 24), (ii) the Ph.D. degree must be completed within 6 years, and (iii) a student must be registered continuously to the end of the Ph.D. degree, unless he or she obtains an approved leave of absence.

2. Course requirements

The overall goal of the biochemistry curriculum is to help students develop the ability to acquire and use scientific knowledge, to identify important problems and opportunities, to develop effective research strategies and creative tools to address them. These goals will help students develop as scientists and, more broadly, across a wide range of future careers that involve approaching complex problems with creativity and rigor. Specific goals are as follows:

1. Help students tackle scientific questions at the level of molecules, cells, and organisms. Courses in Biological chemistry and Biophysics (molecular), Cell Biology (cellular), and Genetics (organismal) cover the diversity of conceptual and experimental approaches required to understand a biological process or pathway at these varying scales.
2. Help students critically evaluate scientific data and read the published literature so they can make good decisions about the validity of scientific models or claims and launch successful scientific or therapeutic research projects.
3. Help students use quantitative and computational approaches in their research.
4. Help students effectively communicate scientific concepts, discoveries, and hypotheses in persuasive, engaging and clear proposals and talks.
5. Provide students with the skills and the confidence to identify important challenges and opportunities in science and in society and to recognize that these skills are transferable to many careers and life goals.

We encourage each student to develop a personalized curriculum based on discussions with the graduate and thesis advisor, their own scientific background, and their scientific interests. Our philosophy is to be flexible so that the curriculum supports each student during their thesis research and in their future career.

Year 1

BIOS 200 – Foundations in Experimental Biology (Autumn Quarter)
BIOC 215 – Frontiers in Biological Research (Two Quarters – Autumn & Winter)
BIOC 257 – Currents in Biochemistry (Autumn Quarter)
MED 255 – Responsible Conduct of Research (intensive one-day class, Any Quarter)
• Write and submit: National Science Foundation Graduate Fellowship Proposal

Years 1-3

Take three full quarter courses in one of the following areas. Each quarter course can be replaced by two minicourses (which run 1-3 weeks). We enthusiastically recommend additional elective courses based on scientific interests.

Biochemistry and Biophysics

Recommended:
BIOC 241. Biological Macromolecules (recommended course)
BIOS 202: Understanding Kinetics for Biologists and Biology (mini-course; recommended in combination with BIOC 241).

BIOS 294: Chemistry for Biologists and Others (BIOC 294) (mini-course)

Additional courses of interest (partial list):
CHEM 283: Therapeutic Science at the Chemistry - Biology Interface
BIOE 102. Physical Biology of Macromolecules
SBIO 242: Methods in Molecular Biophysics
BIO 294: Cellular Biophysics
BIOE 335: Molecular Motors

Quantitative and Computational Techniques
Coding:
CS 106A and CS106B: Programming Methodology and Abstractions
STATS 101: Data Science 101
Mini-courses in R from the Department of Biomedical Data Sciences

Genomics:
DBIO 173A: Foundations of Computational Human Genomics
GENE 214: Representations and Algorithms for Computational Molecular Biology
BIOE 279: Computational Biology: Structure and Organization of Biomolecules and Cells
BIOS 253: Primary concepts in Bioinformatics- To Make Sense Of large scale Biological and Biomedical Data (mini-course)

Statistics:
STATS 101: Data Science 101
STATS 116: Theory of Probability

Mathematical modeling:
BIOE 209: Mathematical Modeling of Biological Systems
BIOS 204: Modeling Cell Signaling (mini-course)

Genetics
Recommended:
GENE 205: Advanced Genetics (recommended course)

Additional courses of interest (partial list):
GENE 211: Genomics
DBIO 210: Developmental Biology

Cell Biology
Recommended:
BIOC224: Advanced Cell Biology (recommended course)

Additional courses of interest (partial list):

MCP 256: How Cells Work: Energetics, Compartments, and Coupling in Cell Biology
CSB 210: Cell Signaling

Year 2

BIOC 350. Development of Thesis Research (students take this as a group during the first quarter of their second year)
Students will develop a specific aims page for their thesis proposal based on small group discussion with faculty. The goals are to critically evaluate the scientific importance, potential impact, novelty and feasibility of the students' chosen research question and then to communicate these clearly in a proposal, to learn about others' research, and to give and receive actionable feedback. The deliverable at the end of this course is the equivalent of a Specific Aims page of an NIH proposal, which will function as the basis of their first proposal (5-page limit).

Year 3-4

BIOC 360. Developing an Original Research Proposal. (Faculty & Alumni led workshop)
A key skill in academic research and in the biotechnology/pharmaceutical industry is the ability to identify unexplored questions, targets or pathways. This comes from critically reading and evaluating a new area of the scientific literature, identifying important gaps or untapped therapeutic opportunities and developing a methodical, feasible and rigorous experimental approach. Students develop skills in these areas by carrying out their specific research projects; the goals of this workshop are to build on and generalize these skills. This workshop will discuss the importance of these skills from both academic and industry perspectives. Working closely in a small group with faculty and alumni, students will identify an important question, technological challenge or therapeutic opportunity in an area outside their thesis research and develop an investigative proposal. The final deliverable will be a presentation and a one page specific aims page, analogous to one you might give in a company to persuade colleagues to pursue a drug target or submit to an agency to obtain funding for a project.

Year 4-5

Choose one of the following (30 minutes each):
(1) Journal Club: Students will work with a faculty member and present a journal article on a topic outside their thesis research.
(2) Research-in-Progress Talk: Students will work with a faculty member other than their thesis advisor and present an update on their thesis research

Elective courses

The elective component of the Ph.D. curriculum empowers each student to design their own graduate coursework experience. Choice of elective courses will depend on each student's scientific interests. Many students end up choosing to take more than the minimal requirement of six graduate-level courses in order to satisfy a desire for both breadth and depth in their graduate coursework. Graduate-level courses from any science, engineering or mathematics department at Stanford may be used toward the elective course requirement, not merely those

in the biosciences. Undergraduate courses may be counted toward the elective course requirement with the permission of the graduate advisor.

Students may wish to consider choosing a few elective courses that will expose them to areas of biological research that lie outside the core proficiency areas most relevant to biochemistry but are nevertheless extremely important in 21st century biology. Examples of such areas include: organismal-level biology and physiology, human health and disease, ecology and evolution, systems-level analysis of biological systems, bioinformatics, physical biology and biological chemistry. Various Stanford departments offer graduate-level courses in all these areas, and new courses are constantly being developed. The graduate advisor and other departmental faculty, as well as other graduate students, can provide valuable input and advice on elective course opportunities.

21st century research will continue to rely heavily on computation in all areas. Incoming Ph.D. students who do not already have some experience in computer programming and computer algorithms are strongly encouraged to acquire familiarity with basic programming approaches during their time here. Several classes focused on biological topics use basic programming within the course for problem sets and projects. Examples that are accessible to all students, including those lacking any programming experience, include: GENE 211 Genomics (Python), BIOS 205 Introduction to R for Data Analysis (R), GENE 218 Computational Analysis of Biological Images (Python), and BIOC 230 Biomedical Data Analysis in MATLAB (MATLAB). For students who already have some programming skills, several more advanced computation-based classes have been highly recommended by Biochemistry Ph.D. students in recent years, including BIOPHYS 279 Computational Biology: Structure and Organization of Biomolecules and Cells, CS 248 Computer Graphics, CS 221 Artificial Intelligence, and BIOMEDIN 214 Representations and Algorithms for Computational Molecular Biology.

Many students find that small, in-depth, literature-based courses that focus closely on a narrowly defined topic are among their most rewarding intellectual experiences in graduate school, providing an important opportunity to think very deeply about the literature and discuss it at a sophisticated level.

3. Teaching

Students are required to gain experience in mentoring, instruction or teaching for one quarter. Possibilities for formal teaching assistantships include: BIOC 205 (Aut), BIOC 241 (Aut), BIO 42 (Win), BIO109a/209a (Win), BIO 109b/209b (Spr), CHEM 181 (Aut), CHEM 183 (Win), HUMBIO 200 (Aut, Win, Spr) and others as approved by your advisor. Students receive academic credit as teaching assistants in these by enrolling in BIOC 221 (The Teaching of Biochemistry) and notifying the Student Services Administrator of the TA course selected. Teaching involves attending all lectures, holding office hours to answer questions from students in the courses, compiling problem sets and answers, helping compile, supervise and grade exams, and assisting with organizational matters including distribution of handouts. More detailed descriptions of TA responsibilities will be provided by the course instructor. Other mentoring and instruction opportunities in local community programs are also encouraged as routes to fulfill this requirement. In addition, direct supervision and mentoring of undergraduate or junior students in the laboratory can also suffice to fulfill this requirement.

4. Fellowship Applications

All first year students are expected to submit predoctoral fellowship applications to the National Science Foundation. Additional information regarding deadlines can be found on-line at: https://www.fastlane.nsf.gov/grfp/.

Students should schedule a meeting with the Graduate Advisor by October 14 to discuss their areas of research for these applications, and each student will choose a faculty member to develop, read and critique their proposals.

All third year students are required to adapt their 1st Proposals into fellowship applications. For US Citizens and Permanent Residents, we expect that you will submit an application for the NIH F31 NRSA Individual Predoctoral Fellowship (due in early December). For international students on visas, we expect that you will submit an application to other opportunies such as the internal Bio-X Predoctoral Fellowship if appropriate (due in January). All students are encouraged to seek out other fellowship opportunities for which they might be eligible. Please https://med.stanford.edu/rmg/funding.html

5. Rotations

Research rotations are critical for students in choosing their thesis lab. In addition, rotations broaden a student's research experience and familiarize students with ongoing research projects.

Rotation possibilities and experiences are discussed quarterly with the Graduate Advisor, or more frequently if desired. Rotations are set up by discussion of the student directly with the faculty member of interest. The first rotation must be carried out in the Biochemistry Home Program Subsequent rotations can be carried out with faculty in any Home Program throughout the Biosciences. Rotations are typically one quarter in length, but the student can arrange more, shorter rotations. Rotations longer than one quarter are strongly discouraged, as the primary purpose of the rotation is to find a suitable thesis lab, not to carry out scientific endeavors to completion.

Students can choose their thesis lab any time after the end of the second quarter. Some students carry out an additional rotation in the third quarter and then choose their thesis lab. Although students have on occasion carried out a rotation over the summer quarter, this is discouraged, as it is typically in the student's best interests to initiate their thesis research to maximize the period that can be devoted to advancement toward the thesis research.

6. Research Proposals and Committee

General Philosophy on Meetings

Students can best explore their creative potential and develop their intellectual and analytical skills through frequent collegial interactions with faculty. In this spirit, committee and proposal meetings are designed to allow an open exchange of scientific ideas and results. Through this,

students learn to develop, organize, and present their ideas and results while benefiting from the experience and insights of committee members. These meetings also provide an opportunity to identify areas for students to focus on as they develop as independent scientists.

Choosing a Thesis Committee

The thesis committee is chosen by the student, in consultation with their advisor. It is made up of at least three faculty members: the student's advisor and two other faculty members from the Biochemistry department. Students are encouraged to include an additional faculty member from outside of the Biochemistry department whose expertise and perspective the student believes will be valuable. Students can petition the Graduate Advisor for exceptions to these guidelines.

A Committee Chair is selected from the assembled committee members (NOT the advisor) by the student to serve in an additional role at committee and proposal meetings to moderate the discussion.

Format of Committee and Proposal Meetings Goals

The goal of the committee meeting is to help the student, specifically in their research, broadly in their development as a scientist, and for faculty to serve as advisors and mentors in their career aspirations and personal growth. While the purpose of these meetings is not for faculty evaluation, faculty do need to evaluate students to discover what advice will be most useful and empowering for the student. Both faculty and students are asked to embrace a growth mindset and allow critical comments to be made and received in a positive, constructive light.

Students can aid the effectiveness of committee meetings by:

- Communicating their agenda and goals to the committee before and at the beginning of each meeting. Never go into a meeting without goals; they may change during the meeting but students should think through what they want to get out of any meeting they lead/attend beforehand.
- Including a timeline to communicate what has happened during the last year as a strategy to inform your committee what you have done without getting caught up in feeling you have to account for your time or prove you have worked hard/been productive.
- Approaching committee meetings as conversations.
- Thinking of faculty as facilitators rather than judges.

Scheduling Committee and Proposal Meetings

All meetings will be scheduled by your advisor's Administrative Assistant (AA), after receiving notice from the Student Services Administrator. While this removes the burden of arranging meetings from the student, the student maintains the responsibility to rapidly communicate information about their course schedule and other commitments to the AA. The committee meeting should be 90 minutes in length. For students in their fourth year and beyond, an additional 15 minutes should be used to discuss future plans.

Prior to the beginning of the meeting the student is to leave the room to provide an opportunity for the advisor and committee to discuss the student. After the meeting if the advisor or a committee member feels it important to discuss the outcome of the meeting the student may be asked to leave the room again for further discussion. At the end of the meeting the advisor must leave the room to give the student the opportunity to discuss any issues regarding the advisor, laboratory environment, personal issues or training goals.

Proposal and Committee Meeting Timeline

	Autumn	Winter	Spring	Summer
1st year	**Rotations**	**Rotations**	**Rotations**	
2nd year	**1st Proposal Course Meetings (BIOC 350)**	**1st Proposal Defense/ Committee Meeting (Jan)**		
3rd year	**Submit Fellowship Applications**	**Committee Meeting**	**2nd Proposal Course Meetings (BIOC 360)**	**2nd Proposal Presentations (September)**
4th year	**< Committee** **< Journal**	**Meeting >** **Club**	**Presentation >**	
5th year		**Committee Meeting**		**Committee Meeting**
6th year	**Committee Meeting**	**Committee Meeting**	**Committee Meeting**	**Committee Meeting**

Research Proposals Proposal Timeline and Topics

Proposal	Due Date	Topic
1st proposal	2nd quarter (Jan) of 2nd year	Thesis research
2nd proposal	4th quarter of 3rd year	Outside research area

Notes:

• Any proposal can be completed at an earlier date. The 1st proposal must be completed within

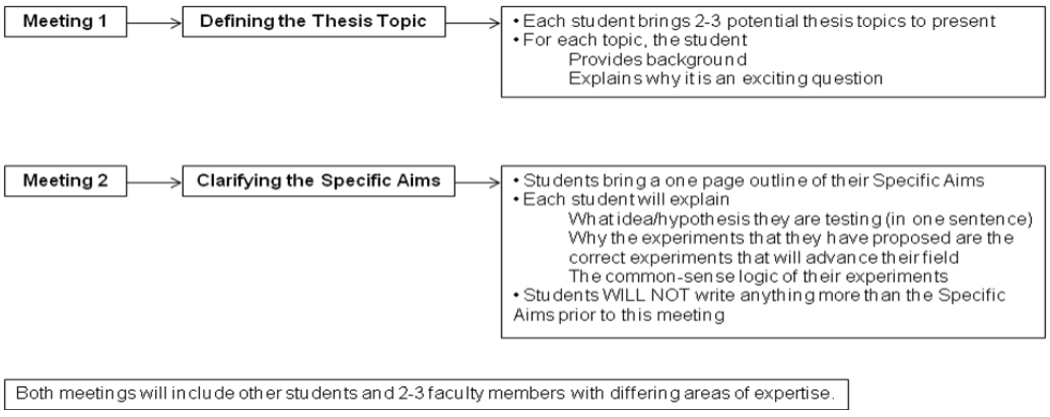
8 months of joining a lab.
- Any exceptions to the above timeline must be discussed with the graduate advisor.
- See below for description of the format and expectations for each proposal.

Research Proposal Format

- All Proposal Defense meetings will be scheduled for 90 minutes and will not extend longer. This includes the time for faculty consultation and post-meeting discussion.

- At the end of each Proposal Defense meeting, the student and faculty committee members will together decide whether feedback will be given as a group or individually. Students are encouraged to take advantage of their committee members for feedback directly following proposal and committee meetings as well as at any other time. It may be useful in these discussions to articulate clear goals for the upcoming year.

- Meetings leading up to the Proposal Defense (as detailed below) emphasize the importance of working out research ideas through discussion before any writing begins:



1st Proposal:

Enroll in BIOC 350 Autumn Quarter of your 2nd Year

In the first proposal the student describes and discusses their planned thesis research.

The goal of the first proposal, and the process leading up to it, is for the student to take ownership of their project. The distinguishing characteristic of the PhD is the intellectual component. This component consists of the following:

> i. Knowledge of the background and intellectual history of a field; ii. Critical appraisal of the experiments, models, and directions of that field; iii. An ability to pose important questions in the field; iv. An ability to derive an experimental plan to address one or more important questions in the field.

Experiments can be carried out by technicians without the requirement of a doctoral degree. In contrast, the intellectual aspect of one's project is here emphasized while recognizing that executing experiments is also critical. Further, a corollary of the above is that knowledge of multiple fields will render one a more powerful scientist. While the preparation time before the first proposal is limited, such broadening will greatly enhance one's ability to identify and solve scientific questions and is thus expected to develop throughout one's graduate experience.

<u>There is no expectation at this meeting for a given amount of initial data to be presented</u>.
Rather, the following is expected:

- A thorough (deep and broad) understanding of the literature that provides the background directly leading to the student's thesis project and the literature pertinent to framing the thesis question and carrying out the proposed research.

- A clear and compelling description of why the proposed research question is interesting and important.

- A clear experimental plan, with contingencies, for carrying out the research. A crude estimated timeline should be presented.

- Most generally, the student should demonstrate the intellectual skills required to articulate the question being addressed, its importance, and how it will be addressed in a thoughtful, well-directed, and logical manner.

How to prepare:

Preparation for the 1st proposal starts as soon as one joins a lab.

- You should have regular meetings with your advisor and discuss your ideas and possible thesis projects, with project ideas coming from both you and your advisor.

- You should read the literature in your area, broadly and deeply. Your advisor may give you references to read, but you should not rely on nor limit yourself to those.
- You should become familiar with other projects in the lab and how they relate to your project. This typically is accomplished by talking with lab mates (typically best when specific times are set aside to talk) and by reading the prior literature from your lab.

- Read multiple papers each week. Over time you will then accumulate a comprehensive background. On the other hand, if you read only when you are forced to, you will have to rely on others for insights and directions in your research.

- It is not possible to prepare for the first proposal simply by taking one week or even one month off from research prior to the 1st proposal and reading all pertinent literature in this compressed period. Such a strategy is counter to the development of a thesis project and the necessary depth of understanding.

- Students should take approximately 1-2 weeks prior to the proposal meeting to prepare the written and oral presentations and to reflect on preliminary data, if any relevant data has been obtained.

Class Leading Up to the 1st Proposal:

Second year graduate students will enroll in BIOC 350, Development of Thesis Research, during the Autumn quarter. The class will meet once a week to prepare you for writing and presenting your proposal. Three instructors (the Proposal Steering Committee) will teach the class. A syllabus for the class will be available on its coursework site.

Second year graduate students will defend their proposals before their Thesis Committee by the end of Winter quarter. For the proposal defense the student will designate one member of the thesis committee (not the student's PI) to act as Chairperson for the proposal defense. The responsibilities of the chair includes: 1) ensuring that the examination proceeds according to the Department's procedures, 2) moderating the discussion to ensure that all faculty have an opportunity to discuss the proposal with the student 3) ensuring that the student is the primary respondent to questions and that no member of the Committee dominates the discussion and 4) writing a summary and evaluation of the exam once complete. See below for guidelines for the written and oral presentation.

Students will adapt their 1st Proposal into fellowship applications for submission in Autumn quarter of their 3rd year. It is strongly recommended that all rising 3rd year students take BIOS 242, Writing Successful NIH Fellowships and K Awards, in Autumn quarter of their 3rd year in order to help with this process.

Specific Guidelines for Written Proposals:

Proposal summary

This should be handed out to your committee at least one day prior to the committee meeting. The first and second proposals are no more than 5 pages in length (single spaced, including figures, excluding references). Suggested lengths for the sections are: **Title**, maximum 80 characters -- the title is important and defines the point of your project; **Specific Aims**, 1/2 page preferred, 1 page maximum; **Background and Significance**, 1 page preferred, 2 pages maximum; **Research Design and Methods**, 2 pages; and **Progress Report**, 1/2 page, but remember that the point of the proposal is not to emphasize preliminary results.
Some may approach the outline above for the first and second proposals. Another example is as follows:

i. Specific aims: Present a small number of experiments (less than five) that you view as most important to the model or to discriminate between models. What specific experimental goals do you actually plan to accomplish over the period of the proposal (34 years)? OR

i*. Specific aims for novel experimental approach: Describe a sequence of intermediate controls that will validate the full experimental approach in a stepwise fashion. In addition, describe <u>one biochemical experiment</u> that you view as <u>the most important application</u> of the novel experimental approach. What would be learned that cannot be learned with existing methods?

ii. Background: This should be limited to one page, if at all possible. The background should not be covered encyclopedically. Rather, the background relevant to points ii and iii below should be concisely covered.

iii. Model: Present one or more models of the biochemical phenomenon that account for all or most of the facts presented in the Background. Specifically, what is hypothesized to be happening at the molecular level? Detail inconsistencies between models and experimental data. The model can be taken directly from the literature, but the student should have thought through the model thoroughly. <u>The proposal should include at least one central figure that describes the model pictorially.</u> OR

iii*. Novel experimental approach: Describe the conceptual basis of the experimental approach and the means to implement it. Justify each technically challenging step by a direct

precedent from the experimental literature. The proposal should include at least one central figure that describes the approach pictorially.

iv. Long term goals: What are the broad, important questions, and why are they important? Often the hardest part of a project is figuring out what question, if answered, would lead to significant insights.

The Oral Proposal:

- A critical feature of the oral presentation is planning and time management. There is a tendency to present too much background information. This should be kept to a minimum, with presentation only of those prior results that provide the intellectual underpinning and are directly relevant to the proposed thesis research.

- The major question to be asked and/or hypothesis to be addressed should be clearly and simply stated, right in the beginning. This should take only a minute or two. Then the background and the proposed experiments should center around this statement.

- The general background should take <5 minutes. With a comprehensive understanding of the area, you should be able to pick out the critical background and field questions on directly and distally related points that your committee may raise.

- The student should be prepared to describe the importance of the proposed research and its relevance beyond the stated project.
- Presenting an estimated timeline for the proposed research can be very helpful in prioritizing experiments.

- It is critical to have considered details of the experimental plan. It is not necessary to present all of this, but very often it is the details of an experiment that provide the greatest challenges or prevent an experiment from working.

- When a proposal is satisfactorily completed, the student should have the written proposal (including the title and date of completion) approved and signed by the faculty advisor and members of the committee and placed in the student's file (see Student Services Administrator).

2nd Proposal

Students enroll in BIOC 360 for Spring Quarter of the 3rd Year. This course will meet using an agreed-upon schedule with the 3rd year students and the faculty on the Proposal Steering Committee.

The aim of the 2nd Proposal is for students to explore their interests and develop their ability to find scientific questions. These questions should meet the following criteria: i. Interesting; ii. Important; iii. Understudied; and iv. Tractable. Since the 2nd proposal is to aid students and their development. Students are encouraged to voice ideas about how to improve their and others' experiences.

In addition to identifying the topic, the student's goals should be to convey to their audience (in a 1-page Specific Aims and in their oral presentation) why the question is interesting and important and give an overview or synopsis of the experimental approaches and design to address it. This latter should be in the form of a brief outline of an experimental plan, with models (or hypotheses), tests, potential outcomes, and interpretations, next steps, and implications. These skills entailed are important across essentially the full range of career directions for students.

The development of proposals will take place in a group format, with input from faculty advisors and other students. Students are also encouraged to seek out other faculty and student experts for advice. This format is viewed as ideal: it allows an exchange of ideas and feedback, and participants often note that they get the most out of hearing advice on others' proposals, perhaps because they can be more objective. In addition, this format allows students to address the frequent challenge of considering, integrating, and sifting through multiple forms of feedback, and determining how to respond.

Any student not wanting to participate in the group activity should petition in writing to the Graduate Advisor, with an outline of their plan and timeline for completing the Proposal in time to present in one of the group presentations.

Each student will provide:

- A 1-page Specific Aims (okay if it goes slightly over); this will be reviewed in meetings and will be handed out to the presentation audience.
- A ~10 minute presentation to the department, with ample time for questions and discussion.

Presentation times: Students will present in groups (September), based on student preferences. The exact timing determined during the BIOC 360 course.

Feedback: Feedback throughout and at the conclusion of this process is key for students getting the most out of this process. To obtain the broadest feedback, students will bring notecards and pens that can be used to provide feedback. Students emphasized that positive feedback is highly welcome—as while they also want critical constructive feedback, hearing about good things done after putting a lot of work into a project is helpful. More specifics guidelines will be developed with the student group.

Committee Meetings

One thesis committee meeting is required per year in years 2-4, two in year 5, and one per quarter in year 6 and beyond. The first committee meeting is covered by the 1st proposal, as this is a presentation of the student's proposed thesis research. However, in the years in which the student has their 2nd Proposal or Journal Club Presentation, additional thesis committee meetings are required. Individual Development Plan (IDP) meetings are a requirement for all Biosciences PhD students and are in addition to the thesis committee meeting requirements:

Student Year	IDP Meeting Due Date	Committee Meeting Due Date	Notes
Year 1	Within 30 days of joining thesis lab		
Year 2	August 1	2nd quarter	Committee Mtg same as 1st Proposal
Year 3	August 1	2nd quarter	
Year 4	August 1	1st or 2nd quarter	Committee Mtg requires a 1-page written progress report
Year 5	August 1	2nd and 4th quarters	Committee Mtg requires a "5th Year and beyond degree-progress petition"
Years 6+	August 1	Each quarter	Committee Mtg requires a "5th Year and beyond degree-progress petition"

Notes:

- Students can request scheduling of an additional committee meeting at any time.
- Any exceptions to the above timeline must be discussed with the graduate advisor.
- To receive a committee meeting waiver, written approval must be sent to the Student Services Administrator by both the student's advisor and the graduate advisor.
- It is the expectation of the Biochemistry faculty that the Ph.D. project should be carried out and defended in five years or less (see policy 1.e.). Students enrolling for a sixth year must petition to the Graduate Advisor with a timeline for graduation and a statement of post-graduation plans. This petition will be required for registration.

Thesis Committee Meeting Format

- Committee meetings will be scheduled for 90 minutes and will not extend longer. This includes the time for faculty consultation and post-meeting discussion.

- Students are encouraged to take advantage of their committee members for feedback during the committee meetings as well as any other time. It may be useful in these discussions to articulate clear goals for the upcoming year.

Individual Development Plan (IDP) and Annual Planning Meetings

Your Individual Development Plan (IDP) and annual planning meeting with your advisor are intended to help you:

- **Take ownership** of your training and professional development.
- **Pause and reflect!** Amidst daily research activities, it is easy to lose sight of longer-term goals.
- **Think intentionally** about your short-, mid- and long-term training and development goals.
- **Identify and use resources** to help you achieve your goals.
- **Have open and direct dialogue** with your mentor(s).
- **Establish clear expectations/steps.**

As of March 31, 2014, the Committee on Graduate Admissions and Policy (CGAP) has adopted a new policy requiring all Biosciences PhD candidates and their mentors in the Schools of Medicine and H&S to create and discuss their Individual Development Plans (IDPs) on an annual basis. This annual IDP meeting is in addition to any required Committee Meetings (as noted above).

Students and their advisors share responsibility for completing the IDP, as well as the consequences of not completing the IDP by the deadlines below. Failure to comply with IDP requirements will

- negatively impact Stanford's ability to receive NIH funding; and
- incur a hold on student registration that prevents stipends from being funded.

Key Deadlines

Action	First Year Students	All Other Students
Schedule a planning and mentoring meeting with your advisor	Within 30 days of joining your thesis lab	Before June 1
Download and complete the appropriate IDP form. (Ideally, share the completed form with your advisor in advance.)	Before your meeting	Before your meeting
Hold your annual planning/ mentoring meeting with advisor	Within 30 days of joining your thesis lab	By August 1
Verify that you and your advisor met to discuss your IDP	Within 30 days of joining your thesis lab	By August 1

See https://biosciences.stanford.edu/current-students/idp/ for more information and IDP forms, including extensive FAQs and resources for both faculty and students.

Questions? Please email bioscicareers@stanford.edu

7. Ph.D. thesis and oral examination

a. Students must complete a draft of the Ph.D. thesis that is acceptable to the reading committee, which is typically, but not necessarily, the same as the proposal committee. Students must also have completed their two departmental research proposals and their Journal Club presentation before the Ph.D. oral examination can be scheduled.

b. Reprints of a student's published work may be included in the thesis. However, if a publication is jointly authored, the student must describe in the thesis their role in that work. In addition, the thesis should contain a general introduction and a general conclusion.

c. At the oral examination, a student will first present to an open audience a seminar on the thesis, after which there is an open question period. Then, the examining committee meets in private with the candidate for further discussion of the general area of the research work and to test the candidate's command of biochemistry and fitness for scholarly pursuits.

d. Please see the Student Services Administrator for the appropriate instructions and forms before establishing a Dissertation Reading Committee and Oral Examination. Your committee must consist of at least five members: four examiners (your thesis committee plus one) and one University chair (chair cannot have appointment in same department as you or your advisor). Approval to deviate from this assemblage requires approval by the graduate advisor and your thesis advisor.

e. Graduate student funding will end with the thesis defense and only on special conditions, on a case by case basis, will a postdoc position be offered.

f. Deadlines for submitting your thesis to the Registrar's Office and applying to graduate can be found on the Registrar's website at: https://registrar.stanford.edu/students/dissertation-andthesis-submission. You must be registered in the quarter in which you will turn in your thesis. Tuition can be reduced in your final quarter by completing a "Petition for Graduation Quarter."
Please see the Student Services Administrator for this form. Other graduation information can be found on the Registrar's website under the Academics tab at: https://registrar.stanford.edu/students.

Notes on thesis preparation

University regulations specify the composition of the examination committee and the format of the dissertation defense. Students should refer to the booklet Directions for Preparing Doctoral Dissertations, available from the Registrar's Office, for specific information. You can also obtain this information at: https://registrar.stanford.edu/students/dissertation-and-thesis-submission. These guidelines should be read carefully before final preparation of the manuscript to avoid costly and time-consuming revisions. Previously published dissertations may not be a good guide to preparation of the manuscript, as the directions have changed. Published papers may be included in dissertations; however, they must meet the University's format guidelines. Manuscripts and figures submitted for publication during the doctoral program should be retained for later reformatting and inclusion in the dissertation.

Seminar Programs

The Department of Biochemistry hosts a biweekly seminar series (autumn-spring quarters) entitled Frontiers in Biology. Seminars are at 4 PM on Wednesdays in the Clark Center Auditorium, alternating with the Developmental Biology and Genetics seminar programs. Graduate students and postdoctoral fellows select and sponsor several of the seminar speakers.

Graduate students are expected to attend all the Biochemistry Department-sponsored seminars. This ensures broad training within our graduate program.

There are many other seminar series of interest ongoing at Stanford. Listings of seminars in various disciplines can be found at: https://med.stanford.edu/seminars/, https://biology.stanford.edu/events/series/department-seminars, https://biox.stanford.edu/events, https://bioengineering.stanford.edu/events/upcoming-events

Biochemistry Journal Club

Our Biochemistry Department Journal Club is designed to bring together students, post-docs and faculty to discuss interesting, exciting and important topics from the literature. Every 4-6

weeks, one 4th year student and one Faculty member will present a research discussion based on recent papers or developing scientific topics of general interest.

The Journal Club, and each student requirement, is in place solely to aid students and their development, and so should be optimized to do so and students should voice ideas about how to improve their and others' experiences. In particular, the Journal Club provides a unique opportunity for students to hone their presentation skills and to bring the department up to date regarding recent scientific developments. It is designed to help advanced students as they begin to present at scientific conferences and apply for post-doctoral and professional positions. Journal club presentations fulfill the third presentation requirement for the PhD degree.

Guidelines. Each student will present on a topic outside their thesis research. This allows students to continue to develop the ability to identify interesting questions and research findings as well as present that research. While the topic should be outside of current thesis topic, being too prescriptive about format or topic can be counterproductive. The guiding principle should be to clearly communicate to the audience why that paper was chosen and to define and articulate the goals the presenter has for their presentation.

Preparation Guidelines:

- Each student will choose a faculty journal club mentor. Send the name of your mentor to the Student Services Administrator a minimum of 2 months in advance of the assigned presentation date.
- Each student, in consultation with journal club mentor, will chose what to get help with and how to get that help (i.e. topic & paper choice, scientific content, presentation). Student may also seek input from multiple faculty.
- Each student will ask 3 (or more) faculty to give feedback following their presentation, and they may specify particular areas that they are interested in receiving feedback. Email these selected faculty at least 1 month prior to the assigned presentation date and cc the Student Services Administrator. Faculty are expected to respond promptly whether they are willing to serve in this role.
    - Students may prefer to request feedback in different ways, but in general students have indicated preference for immediate feedback, directly following the presentation, either verbally or in writing.
    - To obtain the broadest feedback, students will bring notecards and pens that can be used to provide feedback.
    - Positive feedback (hearing about good things done after dedicating a lot of work to the project) as well as critical constructive feedback are emphasized.

Lectures by Students and Postdoctoral Trainees

An important aspect of the training of every graduate student is the development of speaking skills. Opportunities are offered for trainees to speak about their ongoing research in a seminar setting at group meetings, conferences, monthly postdoc/student research talks, Wednesday Science Disco, and the annual departmental research conference each fall.

Group Meetings

Each faculty member in the department has weekly group meetings in which the students and postdoctoral fellows take turns presenting their experiments and/or discussing papers from the literature.

STUDENT SERVICES

Registration

Instructions on registration procedures and payment of fees can be found on the Registrar's website at https://registrar.stanford.edu/students. Graduate students are required by the University to register for Autumn, Winter, Spring and Summer quarters either for 10 units, or TGR until the degree is received. Students receiving stipend checks must register for 10 units or TGR in order to receive a check. Leaves of absence require department approval before departure.

Registration Process

Access to Stanford student privileges (housing, financial aid, access to courses and facilities, etc.) is contingent upon timely and accurate completion of the following primary activities each term:

1. Confirm, through Axess, that the University has your correct address and phone number.
2. Ensure that your University bill is paid. If it is not or if you believe there is an error, please see the Student Services Administrator (Margaret Stanfield) immediately.
3. Clear all holds that may block your ability to enroll in classes.
4. File your study list (the list of courses in which you wish to enroll) and maintain that study list throughout the term, via Axess.
5. If all of your holds have been cleared and Axess does not allow you to enroll, contact the Student Services Center (650-723-7772, 2nd floor in Tresidder Union) for assistance.

Deadlines are set for each of these activities. For example, there are dates set each quarter for submission of the study list, for dropping or adding courses or units, for changing the grading basis for an enrolled course, for withdrawing from a course, etc. Deadlines are published in the Academic Calendar and found on the Registrar's website:
https://registrar.stanford.edu/academic-calendar.

Graduate Student Tracking (GST) System

The Biosciences Graduate Student Tracking System (GST) is a secure online resource for Ph.D. students, faculty, and student services administrators (SSAs); its ultimate goal is to provide support in the related areas of student academic progress, alumni tracking, admissions and training grant application/renewal. It can be accessed via this link:

https://med.stanford.edu/gst/ with SUNet ID authentication. Information on the system is provided at https://biosciences.stanford.edu/current-students/graduate-student-tracking/. Students are asked to enter their Lab Rotations as well as IDP and Thesis Committee Meetings into this system.

Terminal Graduate Registration (TGR)

Students who have: 1) been admitted to candidacy, 2) completed all required course work, and 3) have satisfied the residency requirement of 135 units are required to register for TGR status. Under TGR, tuition fees are substantially reduced.

Students registered in TGR status must enroll each quarter in a TGR course (course #802 for doctoral programs) in the Biochemistry department, with their advisor as the instructor, and for 0 units.

Study List

Preliminary Study Lists are due on the first day of classes. Final Study Lists are due approximately three weeks after the start of the quarter. Students should complete this carefully and submit it by the listed deadlines (otherwise late fees may be assessed, and the course grades possibly delayed). Students submit their study lists through AXESS.

Student Record in the AXESS System

Each student is responsible for ensuring that the University has his or her correct mailing address and telephone number. Addresses and phone numbers should be updated through AXESS, the on-line system for student information. Students can also examine records of their courses and the grades they have received; making it easier to change incorrect information or spot incomplete grades. Incoming students should receive information about AXESS from the Registrar's Office through email; continuing students should consult their AXESS account for more information regarding procedures and University policy.

Candidacy

Admission to candidacy is a judgment by the faculty in the department of the student's potential to successfully complete the requirements of the degree program. Students are expected to complete department qualifying procedures and apply for candidacy by the summer quarter of their second year in the Ph.D. program. This form is forwarded to the Registrar's Office and indicates that the student is formally qualified for the Ph.D. degree and is in good academic standing. The form requires listing completed Stanford course work with at least 3 units of course work taken with each of four Stanford faculty members.

Once a student is admitted to candidacy, the status is valid for five years; subject to termination by the department if progress is unsatisfactory. In special circumstances, it may be renewed by the submission and approval of a new application or extended upon the chairman's recommendation.

Units and Residency

The University's minimum unit requirement for the Ph.D. degree is satisfactory completion of 135 units of course work, reading, and/or research at Stanford. At least three units must be taken with each of four different Stanford faculty members.

Post-graduation Planning

After receiving the Ph.D., many graduates become postdoctoral fellows and research associates in other laboratories before entering research or tenure-track academic positions. At least one and a half years before the expected Ph.D. date, the student should consult their advisor concerning career plans and the strategies and conventions of obtaining fellowships, postdoctoral sponsors or employment in industry. Although applications for postdoctoral fellowships are normally made in the last year of graduate study, decisions regarding sponsors must be completed before the application process begins.

Vaden Student Health Center

The Vaden Student Health Center provides medical care, including a range of counseling and mental health services, to regularly enrolled Stanford students. The center is located at 866 Campus Drive and has a full-time staff of physicians, mental health professionals and nurses. It provides, for free or for modest fees, a program of medical and psychological services to students holding current student I.D. cards.

For hours of operation see https://vaden.stanford.edu/about/hours. Call 650-498-2336 for information and appointments.

Stanford University requires all new students to have completed an Entrance Medical Record. Information on entrance requirements and forms is provided at https://vaden.stanford.edu/about/entrance-health-requirements.

Health Insurance

Stanford students are required to enroll in the Stanford health insurance plan, Cardinal Care, paid along with registration or tuition fees, or provide evidence of satisfactory coverage with an external carrier. Cardinal Care is the comprehensive student health insurance plan sponsored by Stanford University featuring access to Stanford Medical Center. Coverage information for the current academic year can be found at https://vaden.stanford.edu/insurance/cardinal-

careoverview-and-benefits.

Students are automatically enrolled in Cardinal Care unless they waive coverage and have other health insurance. Students must waive coverage before the first quarter in which they are enrolled each academic year (normally this is Autumn quarter). Cardinal Care is waived in Axess by the deadlines listed at https://vaden.stanford.edu/insurance/choosing-your-insurance/important-deadlines. Stanford health insurance charges appear on quarterly University bills (autumn, winter, spring quarters). The phone number for the Insurance Desk at Vaden is 723-2135.

Dental benefits are now available through the Cardinal Care insurance plan. Benefits are administered by Delta Dental of California. Coverage includes diagnostic and preventive services at 100% with no deductible when an in-network Delta Dental PPO dentist is used. Consult your Cardinal Care insurance plan for more information. Information is available on the Vaden website at https://vaden.stanford.edu/insurance/dental-and-vision-insurance-options.

Campus Health Service Fee

This is a mandatory fee that applies to all undergraduate and graduate students enrolled on the Stanford campus ($251/qtr, 2023-24). It covers many services provided by Vaden Health Center, including primary care medical visits, psychological evaluation, and short-term therapy at Counseling and Psychological Services (CAPS), and access to health and wellness programs.

Specific details regarding this fee and its implementation may be found at https://vaden.stanford.edu/insurance/health-insurance-overview/insurance-vs-campus-health-service-fee.

Information about the services provided by Vaden Health Center may be found at http://vaden.stanford.edu.

Stipends

Entering students are offered a stipend and tuition. Students are required to apply for predoctoral fellowships from the National Science Foundation during their first year in residence. Applications are available on the Web and are due in October. Students are also encouraged to apply for other outside fellowships. Departmental funds are used to supplement support from all sources to an annual minimum level of $51,600 (2023-24). ASSU fees, late fees, etc. are the responsibility of each student. Additionally, a one-time document fee of $250 must be paid by the student. Health insurance will be paid by the department if not covered by fellowship institutional allowances. Students may receive stipends quarterly or salary semi-monthly (based on funding source). A U.S. Social Security number is required to receive any funds disbursed by Stanford.

For those students on fellowships who are paid quarterly, the stipend checks are issued approximately two weeks before the quarter begins (provided you are enrolled in classes for the quarter) and are mailed by the Student Financial Services Office to the student's address in Axess. Fellowship stipends are taxable but are not subject to withholding or reporting by

Stanford.
Students receiving stipends are responsible for making any necessary estimated tax payments. Federal Form 1040-EZ and California Form 540-ES are available at https://sfs.stanford.edu/taxes/resources. These forms are also available on the IRS' website.

Students who are paid semi-monthly will be paid on the 7th and the 22nd of the month (or on the preceding work day if these dates fall on a weekend or holiday). Salary assistantships are taxable and subject to withholding and are reported by Stanford on a W-2 form. International students may qualify for federal "tax treaty exemption" - if one exists between the US and their country. Direct-deposit is also available, apply through AXESS.

Students in the Department of Biochemistry (including MSTP students who declare biochemistry as their home program), will be provided a biochemistry stipend allowance totaling $1,500 to utilize throughout their thesis program for books and other incidentals relevant to their training. The stipend must be utilized while actively enrolled in the Biochemistry program. Requests to use department funding should be submitted in writing to the Graduate Student Advisor and the Student Services Administrator. See the Student Services Administrator for additional information.

Tuition

Tuition (10 units) is fully covered by research assistantships or traineeships. Tuition paid by the department is paid directly to the University. Students will receive tuition credit on their University bill.

Tax

Stipends are subject to income tax, but not withholding, so the student must pay estimated taxes (form 1040ES). Please view information found at https://sfs.stanford.edu/taxes should you have a question regarding tax status or payments.

I-9 Requirement

Any individual receiving salaried compensation must have on file a correctly completed I-9 form (Employment Eligibility) prior to commencement of work. International students who are not U.S. permanent residents must have a valid passport and visa with either an I-94 card or an I-20 ID card carrying an employment authorization stamp in order to file an I-9. See the Student Services Administrator for completion of this form.

Academic Standing Policy

Enthusiasm, intellectual growth, and the ability for bench research are essential elements for success in the Biochemistry Graduate Training Program. In cases where a Ph.D. candidate may find these elements to be lacking, the faculty urge the candidate to consider alternate – and likely more rewarding – career development paths at an early stage, with time to explore and excel in another field during their prime years. A graduate committee may also judge that a candidate is not making sufficient progress to complete the Ph.D. degree in a timely fashion, in which case the committee will increase its level of mentoring through quarterly meetings with the candidate and the establishment of concrete, short-term research goals. Continued lack of progress can lead to dismissal from the program. For more information, see the University's policy at: (http://exploredegrees.stanford.edu/graduatedegrees/#degreeprogresstext).

Vacation Policy

Graduate student quarter breaks are not like that of undergraduates because of the continuous nature of research progress. Students have a finite time in graduate school to complete their thesis work. Their success/failure will depend on the choices they make and their dedication to their research. Graduate students are allowed to be away 15 days per year (not including Christmas Day and New Year's Day). Generally, only a portion is used at winter break. All vacation time is to be scheduled as to minimize disruption to their research.

Patent Policy

Stanford's patent and copyright policies apply to any student working on a research project, regardless of the source of aid. You must agree to this policy by completing the form "SU Patent Agreement (SU-18)" located in the AXESS system. The policies allow inventors/creators to retain all rights to inventions and copyrightable materials unless certain exceptions apply. The most important exception is that Stanford claims title to inventions and copyrightable materials (including computer software) made under sponsored research in order to grant sponsors the licensing or other rights required under the agreement. Stanford also claims title to copyrighted material under the following circumstances:

- The work is created for University purposes in the course of employment;
- The work is commissioned by the University;
- The work is supported by a direct allocation of funds through the University pursuit of a specific project;
- Other arrangements are required as agreed in writing

Housing On Campus

Graduate Housing at Stanford accommodates single students as well as those coming to Stanford with a spouse, same-gender or opposite-gender domestic partner, and/or children. Graduate residences include studios and apartments with up to four bedrooms. All Stanford

student housing is smoke-free, and pets are not allowed. All housing assignments are made through a lottery system. If you are new to Stanford and enrolled in a graduate degree program, you are guaranteed housing for your first year of study if you apply by the Lottery deadline and indicate as the final choice on your application that you are willing to live in any residence for which you are eligible. Housing information can be found at: http://studenthousing.stanford.edu.

Off Campus

Many students live off-campus. Community Housing Services provides helpful information on their website at https://rde.stanford.edu/studenthousing/community-housing/, including listings of rentals available in the local area.

The following web sites are also good sources for off-campus housing.

Short term housing:

https://rde.stanford.edu/conferences/interim-grad-housing-pre-autumn-how-apply

Palo Alto Weekly: http://www.paloaltoonline.com/index.php

San Francisco Chronicle: http://www.sfgate.com/

Local newspapers are also a good source of off-campus housing. The Peninsula has several newspapers including the Palo Alto Weekly, published on Tuesdays and Fridays, and The San Jose Mercury News and the San Francisco Chronicle, published daily.

Transportation

Cars

Permits are required for parking on campus. Permit types are: "Resident" (allow you to park at your campus dorm or apartment), "C" (allow parking in C lots), and "A" permits (allow parking in any lot). Both A & C permits are available to commuters (students not living on campus). Carpool and vanpool permits are also available to eligible persons. For more information call the Parking and Transportation Office at 723-9362 or visit their web site, http://transportation.stanford.edu/.

Additional automobile resources include:

- The Dept. of Motor Vehicles in Santa Clara: 3665 Flora Vista Ave, 800-777-0133; and in Redwood City: 300 Brewster, 800-777-0133. It is recommended that you call in advance to set up an appointment.
- California State Automobile Association: 430 Forest Ave., Palo Alto, 650-321-0470.

Bicycles

The California Vehicle Code requires registration of bicycles to aid in identification and recovery if stolen. The Campus Bike Shop at Tresidder Union registers bicycles. Call 650-723-9300 or visit their website at http://campusbikeshop.com/ for information. You can also register your bicycle at the Parking & Transportation Office at 340 Bonair Siding. Engravers are available at the Police Station to engrave a license number or Stanford student identification number on bicycle frames. Stolen bicycles should be reported to the Police Station (650-723-9633).

Bicyclists must follow the same rules of the road as automobile drivers, not pedestrians. Palo Alto and other nearby cities have established a network of bike lanes and paths marked with signs and painted lines to make biking safer. Helmets are recommended but not required. Please note that bicycles are not permitted within the Beckman Center.

Marguerite Shuttle

The Marguerite is the main campus public transport and is free. It operates Monday through Friday all year except on University holidays. Shuttles run to various locations around campus, Palo Alto, SLAC, Menlo Park, and Mountain View. Maps and time schedules are available at https://transportation.stanford.edu/marguerite.

Airport Transportation

Multiple different services provide transportation to and from surrounding airports including train, light rail, and bus line services. These are summarized on the Stanford Transit page (https://transportation.stanford.edu/transit). The trip from San Francisco to Stanford takes approximately 40 minutes and from San Jose to Stanford about 30 minutes. Detailed transit information can also be found on the samtrans website http://www.samtrans.com/schedules.html and the bay area transit website https://511.org/transit.

Health and Safety

Stanford University's health and safety mission is to provide a safe and healthy environment for faculty, students, and staff, protect the University resources against losses arising from various types of occurrences like fires and explosions, and to assure compliance with federal, state and local health, safety and environmental regulations. The University Environmental Health and Safety Office (https://ehs.stanford.edu/) manages health and safety programs for the Medical School such as:

- Health Physics (Radiation Safety)
- Biosafety
- Industrial Hygiene & Fire Safety
- Chemical Safety

Each person working in a lab is required to be trained in the specific hazards of his or her job. Laboratory safety is a component of the orientation to a new lab. It is the Principal Investigator, the Research Associate/Assistant and the departmental Lab Manager's responsibility to provide information and training about lab equipment, procedures and chemicals. To assist, Environmental Health and Safety conducts a course in health physics. New students need to complete the following before they can handle radioactivity:

- Statement of Training Experience
- Take a class and a test (or just a test depending on experience)
- Film badge request

The Medical School has its own Health and Safety Program Office (see http://med.stanford.edu/medfacilities.html). The School's program provides the Lab Manager with safety information and regulatory compliance strategies. The office assists individuals and groups in resolving safety problems. Safety resources include:

- Environmental Health & Safety Office (24 hrs), 3-0448
- Health Physics, 3-3201
- Marc Perez, Lab Manager
- Jennifer Leder, Biochemistry Lab Services Coordinator, 3-6301

The School's Health and Safety Program and University EH&S also have many references and video tapes you can borrow. Each lab should have a copy of the Radiation Safety Manual, Stanford Biohazardous Materials Guidelines, the Beckman Laboratory Safety Manual, Stanford Safety Manual, and the Department of Biochemistry Guidebook.

Facilities

The Department of Biochemistry, housed on the fourth floor of the Beckman Center, is part of the Medical Center complex. Most laboratory space and equipment is shared and members of different laboratory groups are intermingled. This is a popular and efficient way to promote collaboration and intellectual interaction.

Facilities include numerous state-of-the art microscope imaging units, darkrooms, computer stations, glassware and media preparation rooms, a conference room and a library. The Beckman Center houses a Protein and Nucleic Acid (PAN) core facility equipped for the synthesis and characterization of macromolecules. The Fluorescence Activated Cell Sorter Facility is located on the ground floor along with Munzer Auditorium, PAN Facility, Cell Sciences Imagining Facility and the cafeteria.

Stockroom

A stockroom with common lab supplies is available in Room B432. All ordering of supplies and small equipment is handled through the stockroom.

Glassware Facilities

The glassware facilities are located in room B431. The staff in this facility are responsible for picking up, washing, wrapping and sterilizing the department's glassware.

Computer Resources

Stanford University enjoys an extensive and varied computing environment. Connection to the network is through a self registration mechanism available to all users at Stanford through the University Information Technology group (https://uit.stanford.edu/guide/connecting-to-network). The Beckman Computational Services and Bioinformatics Resource (https://cmgm-new.stanford.edu/facilities/br/) provides licensed software to laboratories for many applications in bioinformatics, molecular biology, computation and analysis. For supercomputing resources and access to CPU and GPU clusters the Stanford Sherlock Cluster (https://www.sherlock.stanford.edu/) provides free of charge access and compute time for computation.

Administrative/Social

Daily Department Refreshments
In order to encourage and facilitate interaction among the various labs, the department provides cookies and fruit at 4 PM in the 4th floor lobby. Everyone is encouraged to attend. Department socials are sponsored by labs and held about every three weeks, Friday's at 5 PM, in the lobby or on a nearby lawn.

Supply Room

There's a supply room on the fourth floor available for everyone's use. It includes microwave ovens, a refrigerator, water cooler and photocopier. The room is regularly stocked with office supplies.

Department Mailboxes

Department mailboxes are arranged in the lobby across from the business office (room B400). They are arranged by lab group. Please check your mailbox regularly.

Mail moves between departments and offices at Stanford by interdepartmental (ID) mail. All ID mail should include the four-digit Stanford mail code. Biochemistry is mail code 5307. There is a complete list of mail codes in the Stanford Directory. Stanford mail codes are the same as ZIP+4 codes used by the U.S. Postal Service.

Dining

The Bistro is located on the ground level of the Beckman Building and is open from 7:30 AM to 3:00 PM Monday through Friday. Breakfast and lunch selections are served as well as a large variety of snack items. Seating is available both indoors and outdoors. The adjacent CCSR building has a café that serves breakfast and lunch from 7:30 AM to 5 PM, Monday-Friday, and the LKSC building has the Med Café open 7:00 AM to 7:00 PM, the hospital cafeteria is located on the ground floor of the main hospital building at 500 Pasteur and the Market Square Cafe is open for lunch from 10:30AM-2:30PM in the 300 Pasteur Building.

Card Key Security System

A card key security system has been installed in the Beckman Center and other external buildings within the Medical Center. The Beckman Center has six ground floor doors plus the RAF tunnel door keyed. These doors are also equipped with closed circuit cameras. There is a telephone outside the main front doors to accommodate visitors without card keys. No access card is needed between 7 AM - 7 PM, Monday through Friday (not including holidays) through the main Beckman Center lobby. See Jodee Jenkerson in Room B432 to obtain a card key as well as keys to the lab and shared rooms.

Department Library

The department library is located in B402 and is used for study, seminars, and group meetings. Audiovisual equipment is available for use in the library. To reserve the room, contact your advisor's AA or the Biochemistry Office Assistant.

Conference Room

The department's conference room is located in B475. It is used for group meetings and study. Audiovisual equipment is available for use in the room. To reserve the room, contact your advisor's AA or the Biochemistry Office Assistant.

Bulletin Boards

Bulletin boards located throughout the department display departmental and University information and announcements as well as job opportunities. Upcoming seminars are also displayed on a weekly basis outside B400 and can also be checked via the computer network.

Post Office

The post office at Stanford is a branch of the Palo Alto U.S. Postal Service and is located at 531 Lasuen Mall. The hours are 9-5, Monday-Friday. Post Office boxes are available for annual or semi-annual rental, in a variety of sizes. The zip code for post office boxes at the Stanford University branch is 94309. The ZIP code for all other addresses on campus is 94305. The ZIP code for the Biochemistry Department is 94305-5307.

Banking

The Wells Fargo Bank in Tresidder Memorial Union and the Stanford Federal Credit Union at Tresidder and on Pampas Lane and in 300 Pasteur in the hospital are conveniently located on campus. You can use your student identification card in tandem with Wells Fargo Bank for ATM services. Automatic Teller Machines for Bank of America, Stanford Federal Credit Union, and Wells Fargo Bank are on the second floor of Tresidder and near the Hospital Emergency entrance.

The Li Ka Shing Center for Learning and Knowledge (LKSC)

The LKSC is located next door to Beckman. The fourth floor houses student only facilities, including a fitness center, entertainment area, kitchenette, lounge, variety of study areas including open and banquette seating, computer cluster, soft seating, small group study rooms, project rehearsal area, and traditional quiet reading room. Key card access is required and is limited to students in School of Medicine programs. For information on access and the fitness center waiver form, please see https://biosciences.stanford.edu/current-students/incoming-newstudents/new-student-photo-identification-and-building-access/.

Tresidder Memorial Union

Tresidder Memorial Union is a center of community activity on the Stanford campus. It is located at White Plaza and houses food services; meeting rooms; two pleasant patios; a campus information center; the American Express Travel service; a ticket office for campus and Bay Area events (including BASS); banking services including automatic tellers for Stanford Federal Credit Union and Bank of America, a Wells Fargo branch office with express stops and walk-up windows, an office for account handling and loan applications; Pulse, the University Copy Center; a recreation center offering Stairmasters, stationary bikes, nautilus equipment, free weights; and a hairstyling shop. Tresidder Express carries groceries, magazines and sundries. TMU is also the home of the Associated Students of Stanford University, and Student Organization Services.

Bechtel International Center

Bechtel International Center is located at 584 Capistrano Way (https://bechtel.stanford.edu/). Staff at the Bechtel International Center provide support not just to international students but also to their spouses and to American students. Informal English classes, English conversation practice and language exchanges are among the many programs and services offered to students and their spouses. Counseling on immigration concerns, intercultural adjustment and administrative support for visa processing (in liaison with departments and other campus offices) are also part of the I-Center's service to international students. The I-Center is also the campus administrative office for awards enabling American students to study and conduct research overseas.

Stanford Bookstore

The Stanford Bookstore was incorporated as a nonprofit cooperative in 1987. The main branch is located at White Plaza. New and used textbooks are shelved by courses under the school or department. MICRODISC handles computer hardware and software needs. Also sold are medical, technical, and general books, paperbacks, clothing, souvenirs, stationery, supplies, art prints, and gifts; and there is a photocopying service. Other branches around campus and at the Shopping Center are listed at http://visit.stanford.edu/activities/shopping.html.

Lane Medical Library

Lane Medical Library is in the Medical Center and online at http://lane.stanford.edu/index.html. Services include general reference, in-depth consulting in all aspects of literature research, journal article file management, or any other information access/management needs (e.g., database design); training programs in bibliographic database searching (e.g. Medline), microcomputer/telecommunication based information access support, and training in general library skills.

Lane Medical Library's research collections cover clinical medicine and its specialties, basic sciences, public health, nursing and related fields. With over 3,000 journal titles and approximately 300,000 volumes, the collections rank among the best in the West. Access to bibliographic information was greatly improved with the introduction of Lane's Online Information System (LOIS). Since it is an integrated system, patrons can see if a title is on the shelf, if it is checked out, and when it is due back. LOIS can be accessed 24 hours a day from labs, wards, offices and homes. Access to journal article information is available through online databases of ovid, mdconsult, pubmed, lane catalog, shine, e-journals (http://lane.stanford.edu/biomedresources/ej.html) as well as at SearchWorks (https://searchworks.stanford.edu/), Stanford's online library database. A list of Stanford libraries can be accessed at: http://library.stanford.edu/.

Annual Events - Departmental Research Conference

The Department holds its annual scientific research conference in October. All laboratory groups present talks or posters on current research, and attendance is mandatory. This year's conference is scheduled for October 23-25, 2023 at Stanford Sierra Camp.

Resources

- Biochemistry Department - https://biochemistry.stanford.edu/
- Biochemistry Department Calendar of Events – https://biochemistry.stanford.edu/specialprograms-and-events
- Stanford University Bulletin: Courses and Degrees - https://exploredegrees.stanford.edu/
- Stanford Directory - https://stanfordwho.stanford.edu/
- Graduate Academic Policies and Procedures - https://web.stanford.edu/group/gap/index.html
- Vice Provost for Graduate Education - https://vpge.stanford.edu/
- Presentation Resources - https://biochemistry.stanford.edu/phd-resources

(PDF "Presentation and Writing Resources" available for download)

- Oral Communications Program – https://undergrad.stanford.edu/programs/oralcommunication-program
- Stanford Report - http://news.stanford.edu/stanford-report/

Outreach and Mentoring Activities

The Biochemistry Department recognizes the societal need for community involvement and outreach, and the value of these activities for the individuals who engage in them for their development as scientists, as citizens and as individuals.

While a dichotomy is sometimes drawn between time spent in lab and "outside activities", we believe there is a synergy between them. Lessons learned as a scientist can help one more effectively contribute to society beyond the bench and contributing to one's community can make one a more effective and impactful scientist:

> Development as a scientist is stimulated by seeing problems from different perspectives and learning how to apply scientific approaches more broadly.
>
> The approaches taken as scientists, observing carefully—listening without prior judgment, developing models to explore all possible origins and solutions—help one contribute to challenging community and societal problems on the individual and broader scale.
>
> In addition, activities beyond the day-to-day are often reinvigorating, allowing one to be more effective in lab research and even at times allowing one to spend more time directly involved in research.

Thus, all members of the department are encouraged to participate in community service activities, such as those aimed at improving access to higher education especially for historically underserved communities.

Outreach and mentoring activities that members of the department have participated in/are currently participating in are listed below:

Stanford Science PenPals	https://www.stanfordsciencepenpals.com/
Stanford Summer Research Program	https://www.epatt.org/

Stanford at the Tech	https://med.stanford.edu/genetics/tech.html
East Palo Alto Tennis and Tutoring	https://www.epatt.org/
FAST	https://fast.stanford.edu/
BioAIMS	https://www.bioaims.com/about
BioPeers	https://biosciences.stanford.edu/contact/biosciences-peer-mentorsbiopeers/
ADVANCE	https://biosciences.stanford.edu/current-students/diversity/programsfor-students/stanford-preview-program/
Stanford Prison Education Program	https://vpge.stanford.edu/fellowships-funding/student-projectsintellectual/2019-2020
Stanford Splash	https://stanfordesp.org/
SoLID	https://biosciences.stanford.edu/current-students/diversity/programsfor-students/solid/
FLI - First generation low income	https://diversityandfirstgen.stanford.edu/first-gen-andor-low-incomefli/mentorship/fli-community-mentor-program
Stanford Japanese Association	http://sja.stanford.edu/
Stanford Women in STEM mentoring program	https://wcc.stanford.edu/women-in-stem
Stanford iGEM team	https://biome.bio/igem.html
MSTP Boost	https://med.stanford.edu/mstp/mstp_BOOST.html
Green Scholars Program	https://www.greenescholars.org/get-involved-2

Clubs and Organizations

Stanford Biosciences Student Association (SBSA) http://sbsa.stanford.edu/

Biomedical Association for the Interest of Minority Students (BioAIMS) http://med.stanford.edu/sbsa/resources/bioaims.html

Graduate Student Council
https://associatedstudents.stanford.edu/gsc

Associated Students of Stanford University http://assu.stanford.edu/

Office of Student Engagement https://ose.stanford.edu/

Academic Resources
https://biosciences.stanford.edu/current-students/resources/academic-resources-and-assistance/

Administrative and Lab Services Telephone and E-mail Directory

(Unless noted, staff members are in B400)

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