



CSB

STUDENT GUIDE

Department of Chemical and Systems Biology
Stanford University School of Medicine

2017-2018

Welcome. This guide lists the requirements for CSB graduate students to select and complete their rotations and coursework, to pass the qualifying exam, and to receive a Ph.D. degree in the Stanford Department of Chemical and Systems Biology.

Rotations:

For all incoming 1st year graduate students, the first 2 rotations in fall and winter are in one of the laboratories of the primary CSB faculty (Ferrell, Teruel, Chen, Mochly-Rosen, Jarosz, Wysocka, Qi, Cimprich, Wandless, Elias or Meyer). The goal of these rotations is to introduce students to the unique training and research environment that the CSB department offers. Our goal is to expose students to foundational chemical, systems and cell biology concepts and to teach students how to plan and execute innovative biomedical research. In the 3rd spring rotation, students can rotate inside or outside the primary CSB laboratories. Before selecting a rotation laboratory, check with the CSB Advisory committee whether laboratories and projects of outside laboratories will be a good match for a CSB Ph.D. thesis.

You can discuss potential rotations with CSB faculty at any time even before you come to Stanford, but we request that you finalize your first and second rotation laboratory only after the departmental retreat to have a chance to meet people from the different laboratories and to learn more about potentially interesting rotation projects you may not be aware of. Short talks and poster sessions at the retreat offer excellent opportunities to see which types of research projects are currently active in the labs. As for the concern that laboratories can be full, it is our experience that you will be able to find a rotation place in your laboratories of choice in one of the three quarters. We limit the number of rotating students in the same laboratory in any one quarter to two to ensure that you have a chance to closely interact with the faculty during the rotation. You are required to give approximately 12 minute long presentations about your respective rotation projects at the end of each of the first three quarters at our Pizza Talk series Tuesday at noon. Students rotating in labs within the department will sign up for the corresponding faculty member's CSB 399 section. Students rotating outside the department will sign up for James Ferrell's CSB 399 section 05 and have their research advisor submit a grade via email to James Ferrell for submission in Axess.

Selection of thesis laboratory:

Selection of a thesis laboratory should be initiated by students by discussing projects both with a potential host laboratory PI and also with the CSB Advisory committee to ensure that the laboratory is a good fit for your interest and also whether the laboratory and project will be suitable for a Ph.D. in CSB. Students have a 4-quarter time limit for selecting a research group. In addition, CSB only allows students to join a host laboratory that guarantees weekly individual meetings with the advisor, is providing a scholarly research environment (we expect weekly journal clubs and weekly lab meetings in the host laboratory), is allowing students to actively participate in all CSB program activities, and supports students to attend conferences. If you plan to join an outside laboratory, you have to first discuss your choice with the CSB Advisory

committee. You will be asked to write a one page proposal of your planned project and the primary CSB faculty will determine whether your host laboratory and thesis project aligns with the CSB department's mission. If a majority of CSB faculty determine that the expertise does not allow us to evaluate the proposed research, if the laboratory or project is not a good match, or if a student is not actively participating in the department's seminars, Pizza talks, retreat and other activities, students will be asked to transfer to a home program that offers a better environment for them. Independent of the laboratory you will be working in, if you are part of the CSB program, you are required to attend throughout your thesis the departmental Pizza talks (on Tuesday), the CSB yearly retreat as well as departmental seminars, symposia and social events.

Quarterly student meetings during the first 2 years:

At the end of each quarter, 1st and 2nd year students have a meeting with the Student Advisor committee Jim Ferrell, James Chen and Marisol Urbano to discuss potential issues with the program, issues with host laboratories, classes, qualifying exam and career planning. This is also a good meeting to discuss ideas about student activities as well as additions or changes to the program. Students are also encouraged to meet with the Student Advisor Committee members or the Department Chair individually if any issues come up throughout the year.

Each 1st and 2nd year student will be assigned in addition a faculty advisor who the student can contact for advice about rotations, host laboratory issues, career planning and personal issues. Please feel free to contact your advisor and also Jim Ferrell, James Chen or Marisol Urbano or the CSB department chair to discuss program, personal or other issues as they come up.

Coursework:

You will select courses in an individual quarterly meeting where you discuss with James Ferrell and James Chen training deficiencies and research interests. There are several mandated classes listed below that all students have to take. Our goal with the classes is that you gain a basic knowledge in the fields of Systems Biology, Chemical Biology as well as Regulatory Biology to be able to understand research seminars and papers in the biosciences. In addition, we will make sure that your curriculum is filling critical training holes you may have and also make sure that you gain the expertise you need for your planned thesis research. Please ensure that your units add up to 10 in each quarter (use CSB 399 to reach 10 units). After the second year, students focus on research and typically fill their coursework only with CSB399 units. After 3.5 years, students have to transfer to a terminal graduate student status which reduces the tuition cost.

Coursework required to be completed within the first two years:

- BIOS 200: Foundations
- CSB 201: Bootcamp
- CSB 270: Research Seminar (Required in Fall, Winter, and Spring)
- CSB 399: Graduate Research (Required in Fall, Winter, Spring, and Summer)
- MED 255: The Responsible Conduct of Research
- 1 Systems Biology Course:
 - BIOS 204: Practical Tutorial on the Modeling of Signal Transduction Motifs
- 1 Chemical Biology Course:
 - CSB 220: Chemistry of Biological Processes
 - **OR**
 - CSB 260: Concepts and Applications in Chemical Biology
- 2 CSB Electives:
 - CSB 210: Cell Signaling
 - CSB 221: Methods and Logic in Chemical and Systems Biology
 - CSB 222: Imaging: Biological Light Microscopy
 - CSB 240A: A Practical Approach to Drug Discovery and Development
 - CSB 240B: A Practical Approach to Drug Discovery and Development
 - CSB 242: Drug Discovery and Development Seminar Series
 - CSB 245: Economics of Biotechnology
 - CSB 250: The Biology of Chromatin Templated Processes
- 1 Additional Elective: May be CSB or Other
 - BIOC 224/ BIO 214/ MCP 221: Advanced Cell Biology
 - BIOC 241/ BIOE 241/ BIOPHYS 241/ SBIO 241: Biological Macromolecules
 - BIO 271: Principles of Cell Cycle Control
 - DBIO 210: Developmental Biology
 - GENE 205: Advanced Genetics
 - ❖ Please note that the requirement for one additional elective can be met by the pre-approved courses listed above or by the courses approved by the Student Advisor Committee.

Qualifying exam:

The qualifying exam in the CSB program has to be taken before the end of the second year (before the fall quarter that starts in September). Students themselves make sure that they have fulfilled all course requirements before scheduling the exam. In rare circumstances, an extension of the exam date can be requested and approved by the CSB department chair.

The purpose of the qualifying exam is to determine whether the student is ready to carry out their Ph.D. thesis project. This comes down to four fundamental questions:

- 1. Has the student identified a good problem to work on?** Is the question being addressed (or, in the case of more technological projects, the technology being developed) important, or is this incremental, “me-too” work?
- 2. Does the student have the knowledge required to successfully carry out Ph.D. research?** Does the student have sufficient general background knowledge—the type of information one typically obtains from courses and review articles—for the research project? Does the student have sufficient expert-level knowledge—the more focused but deeper knowledge one typically obtains from critical reading of the primary literature—for the project?
- 3. Is the research plan a good one?** Is the approach direct, feasible, and likely to be definitive? How will the work be followed up if the expected results are obtained, and how will it be followed up if they are not? What are the most likely obstacles? Is there a Plan B (and C and...)?
- 4. Is the student likely to make reasonable progress in a timely fashion?** A logical research plan is important for a successful Ph.D. thesis. So is the ability to get things done. Does the student have the preliminary results in hand to indicate that progress has been made, and will continue to be made?

Both the written thesis proposal and the oral part of the qualifying exam contribute to the qualifying exam committee’s assessment of the student’s performance.

The CSB qualifying exam lasts approximately 2 hours and is attended by the student and three eligible faculty (they have to be tenure track and on the Academic Council), of which at least 2 need to have a primary appointment in the CSB department. The exam committee is chosen by the student in consultation with the thesis advisor. The student has to ask one of the two CSB faculty members on the committee to be the qualifying exam chair in advance of the meeting. The thesis advisor must be present at the beginning of the exam and provide background about the student before leaving the room. In special cases, the thesis advisor may send instead a written report about the student to the three members of the exam committee.

Students present a research proposal orally and in writing. The written thesis proposal should be 5 pages (one inch margin; single line, 11 or 12 pt; Abstract, Specific Aims, Background, Research Plan and Time Line for completion of each aim; Figures are encouraged). The written report must be received by the committee no later than 7 days before the exam, or the exam is canceled. During the exam, the committee will discuss the thesis proposal with the student and ask the student

general questions about the proposed work, background in the field as well as general scientific questions.

The student will leave the room at the end of the exam and the three committee members will then decide by majority vote either (a) to pass, (b) to conditionally pass or (c) to fail the student. The student will be informed immediately after the vote whether he or she passed, conditionally passed or failed. If a student passes or conditionally passes, the student will write a one page report within one week summarizing the suggestions from the committee. This student report will first be sent to the committee members for additions and corrections. Once approved by the committee, the report has to be sent to the thesis advisor and the Program Manager, Marisol Urbano and the student is expected to discuss the points raised by the committee with the advisor. Only after a pass decision and the approval of the student report will the student become a "Candidate for a CSB graduate degree".

A conditional pass can either include a requirement for a rewrite of the proposal or a requirement for an oral re-examination. After a conditional pass, the committee members can only be changed with the agreement of the CSB department chair. If an oral examination is required with the conditional pass, it must be completed within 6 months of the first examination. A final decision has to be made at this oral re-examination. There is only one chance to pass an oral re-examination. If the student passes the re-examination, he or she writes again a report and has it approved by the committee as at the first one. A re-writing of the proposal involves the submission of a revised proposal and requires approval by the committee. In some cases, this may involve more than one round of changes. Also when re-writing is required, the student must pass in 6 months or less from the initial examination date. In all cases, a final pass or fail decision for the CSB qualifying exam has to be made before the end of winter quarter of the third year. Finally, in the case of a conditional pass, the final pass decision is only made after at least two of the three committee members have approved the revised proposal and the revised student report.

If the student fails, he or she has to leave the graduate program. In consultation with the committee, the committee chair will write within a week a report to the student, the advisor and the department chair stating the reasons for the fail decision. The student has the right to make an appeal to the department chair if a student is failed in the qualifying exam. Such an appeal has to be made in writing within one month of the fail decision. In consultation with the CSB department faculty, the chair has then the options to either let the fail decision stand or to schedule a re-examination with the same or different faculty. If approved by a majority of the committee and the chair of the CSB department, a student leaving the graduate program may be qualified to obtain a master's degree.

Miscellaneous: Fellowship applications, ongoing requirements, conferences and

authorship

Students in the CSB program have to apply for possible funding from external and internal sources such as NSF, NIH, Bio-X and others. Each eligible student has to apply to NSF in the fall quarter. Please work on your proposal when you start with the first rotation. We will assign also a CSB faculty, student or postdoc to make recommendations for improvements. To have a good chance, you need to finish a first draft several weeks before the deadline. After the second year, we also request that all eligible students take a training class and apply for an NIH fellowship even if they have or had funding before. These fellowship applications are both a good learning experience and, if funded, are also a good addition to your CV.

Starting in the 2nd year, students give every year a 30-minute presentation of their progress to the department at the Tuesday Pizza talks. They also have to attend the retreat and present a poster or give a talk. Furthermore, students have to attend the departmental CSB Cutting lectures and departmental symposia that were selected by students, postdocs and faculty to include speakers that can explain their work to a broad audience. We also encourage students to meet with speakers after the seminar for lunch (there is a signup email before each visit). We also are asking students for input about selecting potential speakers and make sure that we have a few student-invited speakers every year. We also encourage students to attend department social events: a Holiday party in December, a summer barbeque in June, outdoor game and sports events in nearby parks in spring and fall as well as happy hours.

While covering the cost of conferences is the responsibility of the thesis laboratory, students can get one-time in their PhD career support from the department of up to \$1500 to attend a conference if they will give a talk or present a poster. Please make a request to Marisol Urbano. We encourage students to attend conferences at least once a year starting in the 3rd year of their thesis.

It is not uncommon that there are different opinions about the order of authorship and the inclusion of authors on publications. We recommend that you discuss authorship early in a project - if at all possible before a publication has been submitted. A good strategy is to periodically discuss authorship both with your co-workers and with the thesis advisor as a project advances since the authorship may change as contributions are changing. Contributions to a paper can include significant experimental or theoretical work as well as ideas or unpublished critical reagents or methods. If there is no satisfying solution after such discussions, you should discuss the issue with one or more members of your thesis committee. If there is still no resolution, you may contact the department chair. A final decision may in some cases involve the consultation of an outside faculty to help clarify the relevance of different contributions.

Committee meetings are every 6 months starting after the qualifying exam:

Committee meetings are the best opportunity for you to get feedback about your progress and to get second opinions about which types of experiments you should

pursue to answer the questions you are trying to address in your thesis. To provide you with regular input, we mandate that you schedule committee meetings every 6 months after the qualifying exam. Each of these meetings should be scheduled to be 90 minutes long and should include 4 faculty members counting the thesis advisor (faculty on the committee do not need to be tenure track). At least one of the four faculty members has to be a primary faculty in the CSB department but the composition can be different from that in the qualifying exam and can also change during your thesis work as you may need to pursue different directions. In rare occasions when scheduling is difficult, not all members have to be present and you can meet with missing members separately. The committee is tasked to give you advice about your experiments, future directions, make recommendations about attendance of conferences, career plans and more personal laboratory issues. Each meeting should include a time plan to ensure that the thesis project can be completed within less than 5.5 years. At the beginning of each meeting, the student will exit the room to allow for a discussion between the advisor and the rest of the committee. A few minutes before the end of the meeting, the advisor is asked to leave the room to allow for the student and the rest of the committee to discuss issues about the lab, potential personal issues, training opportunities and to discuss possible differences in research goals or issues relating to authorship. Meetings become more frequent in case the thesis is not completed by 5.5 years. If a committee meeting is not completed by August 31st, an enrollment hold will be placed on the student's account and may delay graduate funding.

Following the committee meeting, as with the qualifying exam, the student is required to summarize the discussion and formulate a revised plan for subsequent work. This summary should be discussed with the advisor and sent to the committee members within one week for comment. A final copy of the report will need to be submitted to the Program Manager, Marisol Urbano.

Ph.D. exam:

Upon completion of your experimental and analysis work, you will be writing a thesis and will be orally defending your thesis to the department and University. The decision to schedule an oral defense requires the support of each member on the committee including the thesis advisor. The University, <https://studentaffairs.stanford.edu/registrar/students/dissertation-thesis>, mandates the format of the defense. In short, the 4 members of your thesis committee are typically also the "Oral Examination Committee" for your thesis defense. We request however that the oral examination committee needs at least 2 primary CSB faculty (all faculty have to be tenured or tenure track, members of the Academic Council). If only one CSB faculty was on your committee, a CSB faculty has to be added. In addition, you will also need a committee chair. The thesis defense chair has to be from a department other than CSB and the home department of your thesis advisor. Potential conflicts about scheduling the thesis defense should be resolved in discussions between the student, advisor and committee, or, if requested, in consultation with the CSB department chair. We would like to see a mean time to degree in the program of 5.5

years or less, which means that you should defend your thesis typically after the end of the 5th year to allow for a writing quarter and a potential 3 month delay to the end of a quarter when the degree is actually granted. At the same time that we expect a time to degree of less than 5.5 years, we expect that each student completes for their thesis one first author paper. By the time you are scheduling your thesis, this paper should be accepted for publication.