Harvard University

Chemical Biology

PhD Program

Student Handbook

Program Contacts

Name	Position	Phone	Email
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Colleen Frain	Grants and Financial Administrator	617-384-9683	cfrain@fas.harvard.edu

Program Advising

Incoming students will meet with steering committee members who will help plan the student's initial program of graduate study. Advisors will meet with the first-year students individually at the beginning of each semester.

Laboratory Rotations

Students in the Chemical Biology Program are expected to take 2-4 laboratory rotations before selecting a Dissertation Advisor. The program does not set time limits on rotations, but most rotations are expected to be 6-12 weeks long. Students should inform the program coordinator when they begin and complete their rotations.

Rotations allow students to explore different research areas, identify potential collaborators, and experience the environment in different research groups. The purpose of the rotation is to facilitate the choice of the dissertation laboratory, not to accomplish a research project. Students may rotate in the labs of program faculty (Harvard faculty who have expressed an interest in having Chemical Biology Program Students in their labs) or with faculty outside of our program.

First year students must choose their dissertation laboratory no later than June 30th.

Course Requirements

Students are required to take CB300: Introduction to Chemical Biology Research, CHEM110: Small Molecules and Biological Processes, MedSci300QC: Responsible Conduct of Science, CB2200: Methods and Tools in Chemical Biology. In the spring semester students must choose between BCMP236: Principles of Drug Action in People and BCMP 250: Biophysical and Biochemical Mechanisms of Protein Function. The final 12 credits of courses are electives; these are typically 4-credit courses but can include 2-credit courses as long as the total is 12 credits. Of these, one elective may be taken SAT/UNSAT.

Registration

Students can register for courses online at https://my.harvard.edu. Once students complete online registration, they are ready to begin using the online course shopping tool. Students will enter their course selection electronically.

In order for students to be considered a full-time student, they must sign up for 16 credits each semester.

- Students who are not taking 4 letter-graded courses and have not joined a lab should sign up for the rotation course, CB399, the appropriate number of times to bring them to 16 credits total
- Students who have permanently joined a lab should use CB350, (under their PI's name) the appropriate number of times to bring them to 16 credits total

Course Catalog

https://my.harvard.edu/

Students can visit this website to access courses and enroll.

Required Courses

ALL YEAR

Chemical Biology 300hf. Introduction to Chemical Biology Research
Phil Cole and Emily Balskus
Fall and Spring Term: Wednesdays 4:30-5:30, room(s) pending

Lectures introduce the research areas of current program faculty in chemical biology. Students must complete both parts of this course (parts A and B) within the same academic year in order to receive credit.

***Note: Students will be emailed the finalized schedule prior to the official start of classes.**

FALL

Chemistry 110. Small Molecules and Biological Processes
Matt Shair
Fall Term: M, W 10:30

This course will cover the chemical and biological principles that govern small molecule therapeutics. We will discuss small molecule conformational analysis, chemical forces that drive small molecule-protein interactions, and small molecule binding to proteins to affect disease states. We will also discuss how protein targets are identified and the frontiers of modern small molecule therapeutics. Protein targets include, but are not limited to kinases, proteases, GTPases, scaffolding proteins, epigenetic modifiers, metabolic enzymes and transcription factors. This course will teach students how to use modern computer modeling applications to perform structure-based design of small molecule ligands.

J TERM

Chemical Biology 2200. Methods and Tools in Chemical Biology (Boot Camp)
Randy King (Medical School) and Melissa Leger-Abraham (Medical School)
M.- F., 9am–5pm - two weeks in January

This course will provide a survey of major topics, technologies, and themes in Chemical Biology, with hands-on exposure to a variety of experimental approaches, followed by an introduction to proposal writing.

Note: Intended for first-year graduate students in the Chemical Biology program; permission of the instructor required for all others. This course will include an introduction to the use of MATLAB for model-building.

SPRING

One of BCMP 236. Principles of Drug Action in People or BCMP 250. Biophysical and Biochemical Mechanisms of Protein Function.

FALL (G2 year)

Medical Sciences 300qc. Conduct of Science

2 Credits. Hours to be arranged.

Note: Restricted to GSAS graduate students on the Longwood campus.

Fellowships

The Chemical Biology Program expects all students who are eligible to apply for fellowships. By the end of the second year, each student must submit their fellowship plans to the program coordinator.

Teaching

Students are required to complete one semester of teaching that is at minimum 0.25 FTE, preferably by the end of their second year. It is recommended that they do not teach and have their PQE during the same term. Students should inform the program coordinator as they make plans to fulfill their teaching requirement.

When students are fulfilling the teaching requirement (aka the first semester of teaching that they perform), their stipend will be reduced by half of the TF salary. Stipends funded by agencies outside of Harvard (NSF, NDSEG, HERTZ, etc.) will not be reduced. NSF fellowship winners should consult NSF regarding teaching restrictions.

Once they have completed their teaching requirement for the program, they will receive the full TF salary for any additional courses that they choose to teach.

TF positions are arranged by each individual department, so there are no universal deadlines or contacts. It is usually best to contact the faculty member or preceptor of the course that you are interested in teaching.

Preliminary Qualifying Exam Guidelines (PQE)

Purpose of PQE meetings:

PQEs are an opportunity for our second-year students to put together ideas and potential plans related to their thesis research, prepare a succinct document on these ideas and plans to a faculty committee, and then meet with their committee to present their PQE proposal and answer questions about it. It is the expectation of the Chem Bio Program and Harvard that the students demonstrate depth and breadth regarding the subject matter of their proposal. Recognizing there is some subjectivity in what constitutes depth and breadth, it is fair and reasonable for students to be asked questions about methods and concepts adjacent to the specific topics of the proposal. Based on their overall performance, the committee will assess whether to grant an unconditional pass, a conditional pass, or a fail. They will also receive some feedback on the strengths and weaknesses of their PQE proposal and responses to questions. The overall goal of the PQE experience is meant to assess that the student is on track to progress to the dissertation phase of their PhD.

Timing and scheduling of PQE meetings:

The PQE should be completed by June 15 of the second year unless approval is granted for an extension. The Chair of your PQE will be assigned by the Program Co-directors and in general will be an experienced Harvard Chemical Biology faculty member. We know it is challenging to schedule PQE meetings and that is why the student should start the scheduling at least three months prior to the desired meeting date (ca March 15). The Program will try to send reminders to you, but you and your Chair should take responsibility to make sure these meetings happen on time. PQEs should be scheduled to allow for 2 hours and preferably should occur in person, but zoom is acceptable if needed by members of your committee.

Composition of PQE committees:

The PQE should include three Harvard faculty members, including the chair, selected in part for their experience related to the proposal topic. The student should consult with the chair of the committee to select faculty members for the PQE. The committee should not include the thesis advisor(s).

Expectations for PQE proposals:

The PQE proposal should normally be about 6-9 pages (including figures but not references) and should include specific aims, background, preliminary data, and future plans. It is recommended that the student share/discuss the specific aims with the chair either in person or by email at least 4 weeks before the PQE to get feedback/advice. The PQE proposal should be written independently, without consultation with the thesis advisor although it is ok to receive advice from other trainees in the lab or the program. The PQE proposals should be shared with the committee at least 7 days before the PQE meeting.

Expectations for PQE meetings:

At least 24 hours prior to the PQE, the PhD advisor should send a paragraph (100-200 words) to the committee about how the student has been doing, strengths and weaknesses, and any concerns the advisor has. At the beginning of the PQE meeting, the student should step out for ca. 5 minutes so that the committee can discuss the advisor's feedback, the proposal and how they may approach asking questions. The student should have a ca. 30-40 minute presentation of their proposal that includes specific aims, background, preliminary data and future plans. It is recommended that the student be given about 10 minutes of uninterrupted time to start to get comfortable and then the committee members can initiate questions in an interactive way. Ideally the exam should end no later than 1 h 45 min to allow for 15 min for committee deliberations after the student steps out again. There is an online PQE form which will be automatically generated for the chair to complete. Before the PQE, the students will enter their committee and PQE details in my.harvard which will prompt the chair to complete the evaluation. This form indicates the decision on Pass, Conditional Pass, or Fail and provides feedback on the proposal and the student presentation and question-answer performance.

Results:

- Pass: The student becomes a candidate for a PhD.
- Conditional Pass: The committee re-examines the student before the end of the fall term of the G3 year. The committee decides the re-examination format, which may involve a written report to address specific concerns of the committee or re-assembled committee.
- Fail: The student withdraws from the program at the end of the term.

Dissertation Advisor and the Dissertation Advisory Committee Policy

Choosing a Dissertation Advisor

When the Dissertation Advisor has been selected (usually by the end of year 1), students should fill out their choice online.

Dissertation Advisory Committee (DAC)

After passing the PQE, a DAC of at least three members (in addition to the Dissertation Advisor) must be appointed by the end of August at the beginning of the student's third year. By the end of November of the student's third year, students should schedule the first DAC meeting, which should occur no later than 6 months after the PQE.

Purpose of DAC meetings:

DAC meetings have several purposes. Most importantly, DACs provide an opportunity for the student and advisor to get constructive feedback about the student's research project from the DAC members, providing strategic and tactical advice, helping address challenges, sharing ideas about publication and professional development, and finalizing the work for a thesis. In addition, DACs help the Chem Bio program make sure that students are getting the support they need, are having healthy mentor-mentee relationships, and are on a reasonable track toward completion in a timely fashion. We thus believe that DAC meetings are a critical element of the training experience.

Timing and scheduling of DAC meetings:

As such, it is important that DACs start early in the third year (no more than 6 months after the PQE) and have follow-up meetings every 12 months thereafter (or more frequently if the student and committee favor it) until the box is checked for thesis writing. We know it is challenging to schedule DAC meetings and that is why the student should start the scheduling at least three months prior to the meeting date. The program coordinator will try to send reminders to you but you and your advisor should take responsibility to make sure these meetings happen on time. DAC meetings should be scheduled to allow for 2 hours but may be shorter at the discretion of the committee.

Composition of DAC committees:

The DAC should normally include three Harvard faculty members, besides the thesis advisor, selected for their expertise in the thesis topic. You can also include a faculty member outside of Harvard, typically someone from another local institution (e.g. MIT). The chair of the committee should be a member of the Chem Bio faculty roster.

Expectations for DAC reports:

The first DAC report should normally be about 6-9 pages and should include specific aims, background, preliminary data, and current and future plans. There should also be a brief section on non-project updates like publications, conferences attended/presented at, internships, and other activities. Follow-up DAC reports should normally be 3-6 pages and include a summary of the work done over the past year, challenges encountered, and non-project updates. The DAC report is normally written in consultation with the thesis advisor. These reports should be shared with the committee at least 7 days before the DAC meeting. Recognizing that the structure may change, you are encouraged to include a tentative thesis outline at your G4 DAC to help the committee provide the most useful feedback as you work toward completing your dissertation.

Expectations for DAC meetings:

At the beginning of the DAC meeting, the student should step out for ca. 5-10 minutes so that the committee can speak to the advisor about how things are going for the student and to highlight any concerns. This should be followed by the advisor stepping out so the committee can ask the student about how they are doing and to comment on their experience in the lab and with the mentor. The student then presents a summary of their research to the DAC committee and advisor in a highly interactive discussion. There is usually a section at the end that briefly touches on the professional development topics and other activities. There is an online DAC form that is created by the student before each meeting and to be filled out by the chair. This form summarizes the work presented and includes recommendations for the student.

We also wish to say that there is a natural tendency to view a DAC meeting as a chance to showcase all the successes. But the DAC committee is often at its most useful when it is helping the student troubleshoot or providing guidance about prioritizing things to follow-up on. That is why it is important not to delay DAC meetings beyond the 12 month periods.

IDPs

Once Chemical Biology students choose an advisor, they are required to complete an Individual Development Plan (IDP) meeting with their Dissertation Advisor (or an alternate Harvard faculty mentor of their choosing) annually. An IDP provides students with the opportunity to think about their training objectives, their progress towards them, and to set and/or refine goals for the future with their mentor. The National Institutes of Health (NIH) encourages trainees to make Individualized Development Plans to help them prepare for academic and non-academic careers. IDPs are essential to the training grant and program's continued success.

Students and their mentors should read the Molecular Cell article "Yearly Planning Meetings: Individualized Development Plans Aren't Just More Paperwork" that describes an approach to implementing IDPs and the benefits of IDPs. We also encourage students to visit the Harvard Office of Career Services and http://myidp.sciencecareers.org where they provide additional IDP resources and excellent articles related to mentorship and science careers.

Sharing the IDP form is not a requirement, nor will the IDP form be kept on file by the program. Students are free to share as much or as little of the plan as they feel comfortable. Note that the IDP process will be most effective if used to guide candid discussions with an advisor. Students must notify the Program Coordinator of the IDP meeting date and the name of the faculty member that they met with. For G1 students, the fall semester meeting with their faculty advisors that takes place in January will serve as this planning meeting.

Dissertation Preparation and Defense

The Dissertation Advisory Committee, in consultation with the Dissertation Advisor, determines when it is time for a student to stop laboratory work and begin to write a dissertation. Once a student has been given permission to write a dissertation, the Program Coordinator should be contacted to schedule an appointment to discuss requirements, dates, etc.

For more information, see Dissertation Formatting Guidance at https://gsas.harvard.edu/resource/dissertation-formatting-guidance

Dissertation Examination Committee

GSAS states that the Dissertation Examination Committee must be comprised of three faculty members, including the dissertation advisor. Two of the faculty must be FAS faculty or be a member of the program faculty. The third member can be from outside of Harvard. The chair of the committee must be a member of the program faculty. The Chairperson of the DAC should preferably chair the examination, but students may invite another DAC member to do so. The role of the chairperson is to (a) be impartial, (b) arbitrate problems, and (c) administer the exam.

Once given approval to defend, the student must defend within 6 months. It is perfectly acceptable to use the DAC committee for the defense committee. It is not a requirement that students choose new committee members.

Events and Seminars

Data Club Talks – Student Talks

Third year students will present their data in an informal setting to fellow students and faculty in the program. It is expected that all students in the program will attend these talks as they will serve as an invaluable part of their education and a wonderful opportunity to develop a dialogue to discuss the big questions of Chemical Biology. The talks will be 10 minutes in length followed by 5 minutes of questions and answers from the audience. These will be scheduled by the Chem Bio administrative team, and there will ordinarily be two data club meetings each term.

CCB Seminars

The department of Chemistry and Chemical Biology offers several seminar series that feature a wide range of topics from organic and inorganic to human disease, etc. Many of the series feature speakers that represent both CCB and CBP faculty as well as those from outside Harvard and MIT. For listings, please visit https://www.chemistry.harvard.edu/calendar/

Other Seminar Series

Many of the individual departments throughout the Cambridge and Longwood Campuses, and the Broad Institute, offer seminar series that may interest students of the Chemical Biology Program. We encourage all of our students to explore the variety of seminar options and attend whenever feasible. CBP students should contact program or Department Coordinators to be added to seminar mailing lists that interest them.