

Graduate Program in Biological Chemistry Johns Hopkins School of Medicine

Program Overview

The graduate program in Biological Chemistry (BC) focuses on teaching a rigorous scientific approach to biomedical research within the overarching theme of the department: elucidating the molecular basis of important biomedical processes. Specific research programs within the BC program explore the biochemical, genetic, and cellular bases of numerous physiological processes, including neurobiology, synaptic biogenesis, immunity, cell & developmental biology, glycobiology, protein structure & folding, signal transduction, & metabolism. Faculty research also spans the biomedical spectrum, with projects addressing critical issues in a wide array of human diseases, including cancer, pain, obesity, diabetes, infectious disease, autoimmunity, and inflammatory diseases. Furthermore, the BC program combines its rigorous curriculum and outstanding research opportunities with flexible and personalized training environment in which there is significant personal interaction in one of the preeminent research universities in the world.

Year 1 BC Program Requirements

- 1) Foundations of Modern Biology Core Course
- 2) 4th Quarter Electives (2)
- 3) Topics in Biological Chemistry
- 4) Research Ethics and Professional Development -1
- 5) Laboratory Rotations (Up to 4, typically 3)
- 6) Departmental Seminar, Tuesdays at Noon (or a suitable alternative)
- 7) Thursday Evening Dinner Symposium (Monthly)
- 8) BC Graduate Student Colloquium (Monthly)
- 9) The Departmental Retreat

Foundations of Modern Biology Core Course (composed of eight course modules -students must take all eight). This set of modules is designed to provide students with a broad foundation in fields most relevant to the conduct of biomedical research in The Department of Biological Chemistry:

Biochemical and Biophysical Principles

Macromolecular Structure and Analysis

Molecular Biology and Genomics

Genetics

Computational Biology and Bioinformatics

Organic Mechanisms in Biology

Pathways and Regulation

Cell Structure and Dynamics

4th Quarter Electives During the 4th quarter of Year 1, students must take two electives from the 4th Quarter BCMB list. These courses are designed to provide a deeper immersion into topics such as Virology, Neuroscience, Protein Structural Biology, Developmental Biology, etc., than can be provided by the Fundamentals course. The availability of electives will likely vary from year to year. A list can be obtained from the BC Program Administrator during the third quarter. Please note that some electives exhibit overlapping schedules and cannot be taken concurrently.

Topics in Biological Chemistry (Meets twice a month). This course takes place two Thursdays per month beginning in October. First and second year BC students discuss papers selected by a faculty member, that take a topic from the coursework and go into greater depth. Faculty members should provide a PDF of their article(s) to the BC Program Administrator at least one week prior to the class.

Laboratory Research Rotations and Selection of Thesis Lab. Laboratory research rotations give Year 1 students the opportunity to learn about the scientific problems and approaches tackled in a given lab and determine whether that lab will be a mutually good fit for the student's thesis. During their time in the lab, a student is expected to participate fully in all laboratory activities, including research, lab meetings, and journal clubs, as permitted by their course schedule. It is the student's responsibility to seek out laboratories for their rotations prior to the start of each rotation period. However, the Program Director will help students evaluate their options and make decisions regarding a rotation or thesis lab. It is important to note that a given laboratory might or might not be open to rotation students during a given rotation period. Therefore, the student should contact the potential advisor ahead of time to determine whether a rotation in that lab will be possible and to make other plans, if necessary.

Once you have selected your rotation lab, please inform Darlene Sutton of your choice.

Please consult the school of Medicine Academic Calendar for a complete list of School Holidays.

By the end of Year 1, students should select a thesis laboratory and notify the Program Administrator of their choice. Many students will do three research rotations. However, if a given student wishes to join a lab for their thesis after their first or second rotation, this is permitted, with the consent of the Program Director and the intended thesis advisor. Similarly, a fourth rotation is permitted with the consent of the Program Director. All faculty with primary appointments in The Department of Biological Chemistry are eligible to serve as rotation or thesis mentors. Faculty with secondary appointments in Biological Chemistry may serve as rotation or thesis advisors with the consent of the Program Director on a student-by-student basis.

Professional Development and Ethical Conduct Discussions All students are required to take ethics training, which has both didactic and face-to-face (3h) components. The following themes are covered:

- A. The scientist as a responsible member of society
- B. Research Misconduct
- C. Data Acquisition and Management
- D. Authorship and publications Processes
- E. Mentor and Trainee Responsibilities
- F. Use of Animals in Research
- G. Conflicts of Interest
- H. Collaborative Research
- I. Human Subjects.

Please enroll in Intro to Research I and II during your first and second year.

Departmental Seminar (Physiology 612, Tuesdays at Noon). Seminar is given by faculty, both invited and departmental faculty. Students are, of course, welcome to attend any of the many public seminars available in the School of Medicine, School of Public Health, or Homewood Campus. However, excessive attendance of seminars that interferes with fulfilling the student's other academic and research requirements should be avoided. The latest schedule can be found on the Departmental Website (<http://biolchem.bs.jhmi.edu/Pages/default.aspx>).

Thursday Evening Departmental Symposium (monthly) Each month during the academic year, students and postdocs (selected by the PI) from one lab in the BC Department present their research. All Departmental members attend and participate in the discussion. The latest schedule can be found on the Departmental Website (<http://biolchem.bs.jhmi.edu/Pages/default.aspx>)

BC Student Colloquium (meets approximately monthly) This is a student-run series in which one student per month, usually a more senior BC student, presents their laboratory research to BC students from all years. It offers an opportunity to hone scientific presentation skills, learn about research in the Department, and get to know the other students in the Program. Food is provided. The latest schedule can be found on the Departmental Website (<http://biolchem.bs.jhmi.edu/Pages/default.aspx>)

Performance Evaluation – Year 1:

Didactic Courses - Students must earn a passing grade (B- or better) in the Foundations of Modern Biology Core Course and in their 4th quarter electives. If a lower grade is earned in a given course, that course must be retaken the following year and the student must receive a passing grade. In the event that a student fails to pass the course upon retaking it, or if a student fails to pass more than one of the core modules or 4th quarter electives during year 1, this may constitute grounds for dismissal from the Graduate Program.

Topics in Biological Chemistry - Students must attend all sessions and participation must be satisfactory, as assessed by the faculty instructors.

Ethics and Professional Development – Attendance is mandatory and will be confirmed at each session.

Research Rotations - Student performance in research rotations must be satisfactory, as evaluated by the research advisor.

Meeting with BC Director – Students will meet once a year with a BC director (August-September) to discuss their progress and any concerns the students have.

IDP – Once students have completed their rotations and chosen a laboratory, they will fill out an **Individual Development Plan** annually.

Year 2 BC Program Requirements

- 1) Thesis Research
- 2) Elective Courses
- 3) Research Ethics 2
- 4) Thesis Proposal (2 weeks prior to DBO)
- 5) Doctoral Board Oral Exam (October-December)
- 6) Thesis committee Meeting (6 months after DBO)
- 7) Departmental seminar
- 8) Thursday Evening Dinner Symposium
- 9) BC Graduate Student Colloquium
- 10) Departmental Retreat

Thesis research: Students are expected to spend a majority of their effort during years 2 and higher conducting original scientific research towards their thesis. During that time they should participate fully in laboratory research, as well as other activities such as lab meetings and lab journal clubs, in compliance with the policies of the individual lab.

Elective courses: Prior to graduation, students must take four elective courses in addition to the two 4th quarter electives taken during Year 1. These additional electives can be taken any time prior to the completion of their other thesis requirements. Electives must augment the biomedical research training of the student and must be approved by the Program Director. Students must earn a passing grade for a given elective to count towards this requirement. Electives that are unrelated to the student's biomedical training or involve minimal time commitments may, in some cases, be deemed inappropriate to qualify for credit towards this requirement. Electives may be taken either for a letter grade or Pass/Fail.

Doctoral Board Oral (DBO) Exam

Purpose: This is a University-mandated oral exam that is designed to test the depth and breadth of a student's knowledge of biomedical science relevant to the scope of the Biological Chemistry Graduate Program. A student must pass this exam in order to be eligible to continue towards their thesis.

Timing: The exam must take place by the end of December during Year 2. In order to be eligible to take the DBO exam, a student must have successfully passed all of the required first year coursework. If the student fails one or more of the Fundamentals of Modern Biology Core modules, that student must retake the necessary module(s) and receive a passing grade before taking the DBO. If a student fails to pass one of the fourth quarter electives during Year 1, they will be required, at the discretion of the Program Director, to retake and pass that elective or, alternatively, to take and pass another elective offered earlier during Year 2. Students should submit their Thesis Proposal to their committee, no less than two weeks before their DBO (*below*).

Committee Composition: The DBO exam is administered by a Committee of five Johns Hopkins faculty members, and is selected by the Thesis Advisor. Two of the Committee members must have their primary appointments in The Department of Biological Chemistry, two must have their primary appointments outside the Department, and the fifth may be in either category. There should be no more than three faculty with primary, joint, adjunct, or secondary appointments in the Department of Biological Chemistry. It is also recommended that at least two of the External Faculty hold the rank of Associate Professor or Professor.

Once the DBO Committee is selected, it is the faculty's responsibility to schedule a mutually convenient 2hr time slot for the exam. The Program Administrator will then submit a form outlining the Committee composition and time to the Doctoral Board for approval. The DBO form should be submitted to Darlene

Sutton no less than 1 MONTH before the scheduled date. The thesis advisor will not be one of the Committee members, but is expected to provide a brief introduction to the committee prior to the exam.

DBO Format: Typically, the exam begins with the student standing at a whiteboard giving the Committee a very brief (~5 min) description of what they are working on in lab. Although the exam will likely not focus on this project, the introduction provides the Committee with an idea of the student's scientific interests and focus. Each Committee member then takes a turn asking the student questions. The scope of the exam will be related to the Year 1 coursework and to general aspects of biomedical research considered by the Committee to be relevant to this coursework.

Possible Outcomes: There are three possible outcomes of the DBO.

1) Unconditional Pass – the student has answered the Committee's questions to the Committee's satisfaction and is eligible to continue towards their thesis.

2) Conditional Pass – The student's performance is generally satisfactory, but there are one or two areas in which improvement is merited. Under these circumstances, the Committee will decide what Condition the student must fulfill in order to subsequently pass the exam. Examples of conditions include being asked to take a specific course, being asked to write a topical review on a particular area, or being asked to review a particular area, then meet with one or more Committee members to demonstrate an understanding of that area. Once the Committee members are satisfied that the Condition has been met, the student has passed the exam.

3) Fail – If the student's performance in the DBO exam is deemed by the Committee to be substantially deficient, he or she will fail the exam. In this event, the student must retake the DBO exam within the next 3 months. If possible, the Committee composition for the reexam will remain unchanged. However, the membership of the Committee may be altered, with the approval of the Program Director. The student must pass the reexam in order to remain eligible to continue in the Graduate Program.

Thesis Proposal: Prior to the DBO, the student will prepare a proposal, similar in format to an NIH Postdoctoral Fellowship Proposal, outlining the scientific problem to be studied in their thesis work, and the experimental approach to be taken. This represents a change from prior years, where the thesis proposal was due before the first thesis committee meeting. This change is designed to improve the time to degree.

This proposal should be divided into the following sections:

1. Specific Aims – A concise listing of two to four major goals of the thesis work
2. Significance and Impact – What is the scientific problem to be studied, why is it of scientific and/or biomedical importance, and what are the specific hypotheses to be tested?
3. Innovation – What are the innovative aspects of the hypotheses to be tested and/or the experimental approaches to be employed?
4. Experimental Approach – How will each specific aim be achieved? What are the expected outcomes? Include any preliminary data that support the scientific merits or feasibility of the project. What problems might one encounter and what alternative approaches might be taken to circumvent these problems? Also include a brief timeline of expected progress.
5. References

Sections 1-4 should be no longer than 10 pages.

The scope of the proposal should be limited to work that could reasonably be achieved by a skilled trainee within a three year period. The student is encouraged to obtain feedback from their advisor and any other individuals who might be able to provide relevant expertise, but should write the proposal themselves.

Thesis Proposal and Thesis Committee

Purpose: Annual thesis committee meetings offer students the opportunity to draw on the expertise of the diverse Johns Hopkins faculty to help them develop a coherent and feasible plan for their thesis research, resolve difficulties encountered in the work, maximize the scientific impact of the thesis project, complete the thesis in a timely manner, and consider career development beyond the PhD program.

Timing: The first thesis committee meeting should be held approximately six months, and no later than 12 months, after completing the DBO. In the event that a student does not pass the DBO in their first attempt, the first thesis meeting must be held no later than 6 months after passing the DBO. In the event that a student changes thesis labs, the first thesis meeting must be held no later than 9 months after joining the new lab. The student, new thesis advisor, and Program Director will formulate a revised timeline for completion of degree based on circumstances.

Committee Composition: The composition of the committee is up to the student and his or her advisor, but should include, in addition to the advisor, at least three Hopkins faculty members whose expertise will be of value to the student's thesis. Of these individual, the most senior faculty member who is not the student's advisor will be the Committee Chairperson. Once a thesis committee is selected, the student should arrange a mutually convenient time slot (~2 hr) for the meeting to take place and arrange with the Graduate Program Coordinator to schedule a conference room (equipped with a projector) during that time.

Thesis Proposal: Prior to the first thesis committee meeting, the student will update their thesis proposal (prepared before DBO) which should be delivered to the members of the thesis committee at least one week prior to the meeting.

Progress Report: For each annual thesis committee meeting (after the first one) students should send their original thesis proposal to their committee, as well as their current C.V. and a document that briefly describes their progress, technical challenges, and rationalizes major changes in directions. A suggested format is below:

- 1) State original aims of project;
- 2) Summarize preliminary data presented at last meeting (Bullet points are okay);
- 3) Summarize goals from last meeting;
- 4) Summarize progress. Typically, this might be one or two sentences describing each goal followed by bullet points summarizing relevant progress and challenges.
 - a. Some students include figures.

Meeting Format: The student will give a powerpoint presentation outlining their proposal. The Committee and the student will discuss the planned scientific direction and approaches to be taken. The Committee will provide suggestions for revising the strategy or scientific focus to maximize the likelihood that the project will successfully lead to an advancement of knowledge and can be completed in a timely fashion.

Thesis committee form: At the end of each meeting, the Chairperson will fill out a form (shown on the next page), signed by the other members of the thesis committee that outlines the student's progress, any areas of concern, and a timeline for completion of their degree requirements.

Performance Evaluation – Year 2

Thesis Research – The student’s performance and progress will be evaluated by the thesis advisor. The advisor will provide the student with a written evaluation of the strengths and weaknesses of their performance and progress, and future goals for the coming year and will meet with the student to review this evaluation.

Doctoral Board Oral Exam – See above

Elective Courses - Students must earn a passing grade (B- or better) in the Elective Courses in order for them to count towards the Program requirement.

Topics in Biological Chemistry – Second year BC students must attend all sessions and participation must be satisfactory, as assessed by the faculty instructors.

Individual Development Plans: Once students have completed their GBO, they will fill out and discuss their individual development plan with their thesis advisor. A copy of this plan should be submitted to the BC Graduate Program Administrator (Darlene Sutton).

Meeting with BC Director – Students will meet once a year with a BC director (August-September) to discuss their progress, their IDP, and any concerns the students have.

Year 3 and higher BC Program Requirements

- 1) Thesis Research
- 2) Electives (if requirements not yet fulfilled)
- 3) Departmental Events (Seminar & Thursday Evening Dinner Symposium)
- 4) Annual Thesis Committee Meeting
- 5) IDP

Performance Evaluation – Years 3 and higher

Thesis Research – The student's performance and progress will be evaluated by the thesis advisor. The advisor will provide the student with a written evaluation of the strengths and weaknesses of their performance and progress, and future goals for the coming year and will meet with the student to review this evaluation.

Thesis Committee Meeting Reports – See above

Individual Development Plans: Students will complete their individual development plan with their thesis advisor. A copy of this plan should be submitted to the BC Graduate Program Administrator (Darlene Sutton).

Meeting with BC Director – Students will meet once a year with a BC director (August-September) to discuss their progress, their IDP, and any concerns the students have.

Time to Degree Policy - Biological Chemistry Graduate Program

The following policies are designed to ensure that students complete their PhD requirements in a timely fashion:

1. The Doctoral Board Oral Exam (DBO) must be completed by the end of second year (24 months from matriculation). The first thesis committee meeting should be held approximately six months, and no later than 12 months, after completing the DBO.

In the event that a student does not pass the DBO in their first attempt, the first thesis meeting must be held no later than 6 months after passing the DBO.

In the event that a student changes thesis labs, the first thesis meeting must be held no later than 9 months after joining the new lab. The student, new thesis advisor, and Program Director will formulate a revised timeline for completion of degree based on circumstances.

2. It is expected that students will meet annually with their thesis committees.
3. Labs with delinquent students will be closed to rotation students unless the Program Director grants permission.
4. Student, advisor and committee members must complete and sign a BC Program thesis meeting form that contains written feedback on the student's progress.
5. After completion of Year 5 (60 months post-matriculation), meetings must be held semi-annually at which a Program Director or Program Director's designee (other than the student's mentor) must be present.
6. The Program Directors may assign a Co-Advisor to students who have been in the Program more than 5 years, following consultation with the Student and their Advisor, to facilitate the student's progress towards the PhD Degree.
7. A terminal masters will be recommended if PhD is not complete by end of year 8, unless the Program Director grants permission for continued study. [NOTE: Official leaves of absence are not included].

Recommended Goals for Thesis Meetings

Year 2, Meeting #1 (by 24 months post-matriculation)

Evaluate thesis proposal or plan for development of thesis proposal.

Year 3, Meeting #2 (by 36 months post-matriculation)

Evaluate progress during previous year. To facilitate this, student should include an outline of previous findings along with new findings in thesis presentation.

Year 4, Meeting #3 (by 48 months post-matriculation)

Evaluate progress during previous year. To facilitate this, student should include an outline of previous findings along with new findings in thesis presentation. In addition, student should prepare a written thesis completion plan and address future career goals in presentation.

Year 5+

Subsequent annual meetings should follow format of Year 4 above.

RECORD OF ANNUAL THESIS COMMITTEE MEETING

NOTE: Thesis committee meetings have the option of beginning without the student present for the mentor to review the student's progress with committee members. At the end of the meeting, the student may opt for the mentor to leave the room and talk alone with committee members.

Name of student: _____ Matriculation year: _____

Name of advisor: _____ Date of meeting: _____

Number of previous thesis committee meetings: _____

The most senior member of the committee usually serves as the "chair", and should fill out the required information after discussion with the committee.

Committee evaluation of progress (check one):

- The student is on trajectory for completion of PhD in ___ 1 year, ___ 2 years, or ___ > 2 years
- Concern regarding trajectory or thesis project (*student/advisor must meet with program director*)

Please provide a brief summary of the committee recommendations on the reverse side of this form.

The above named student is in the final phase (final 6 months of training) and will be allowed to write a dissertation and graduate when the items listed on the reverse are complete:

- Yes No

Advisor's signature

Date

Student's signature

Names and signatures of other Committee Members present:

- | | | |
|----|---------------------|------------------|
| 1) | _____ | _____ |
| | <i>Name (Chair)</i> | <i>Signature</i> |
| 2) | _____ | _____ |
| | <i>Name</i> | <i>Signature</i> |
| 3) | _____ | _____ |
| | <i>Name</i> | <i>Signature</i> |

Summary of committee recommendations (for students not in final phase):

The committee agrees that the student is in the final phase and that completion of the following allows the student to write their dissertation and graduate:

Students in the final phase are expected to complete requirements within six months of the final thesis meeting. If the student is unable to do so, another meeting will be scheduled [by the Graduate Program] after six months.

Vacation Policy

In addition to University Holidays and Breaks, students are permitted the following vacation time:

Year 1: Maximum 2 weeks

Years 2 and Higher: Maximum 3 weeks

It is strongly recommended that the students obtain the consent of their thesis or rotation advisor prior to scheduling vacation time.

Leave of Absence

Students may take 15 calendar days of sick leave per year that can be applied to pregnancy/childbirth. Under special circumstances, this period may be extended by the training program director or the sponsor.

Sick leave is not accrued. For a medical leave of absence, health insurance will be paid for by the program or sponsor for up to one year, if requested by the student.

Parental leave of 30 calendar days per year can be used for the adoption or birth of a child. Parental leave is not accrued.

A period of terminal leave is not permitted and payment may not be made from grant funds for leave not taken.

Grounds for Dismissal from the Graduate Program in Biological Chemistry

Students may be dismissed from the Graduate Program, at the discretion of the Program Directors, for any of the following reasons:

Failure to pass the Doctoral Board Oral Exam on the second try

Failure to obtain a passing grade on more than one required first year course

Failure to obtain a passing grade upon retaking a required first-year course or elective

Persistent lack of satisfactory performance in thesis or rotation research

Failure to comply with Johns Hopkins University Policies on Responsible Conduct of Research or appropriate professional behavior

Where to go for advice or information

Program Co-Director: **Stephen J. Gould**, sgould@jhmi.edu, Physiology 409, 443-847-9918.

Program Coordinator: **Darlene Sutton**,
scheduling, paperwork, etc. – (dsutton5@jhmi.edu, 410-955-3086)

Office of Graduate Student Affairs and/or Associate Dean, Graduate Biomedical Education, **Dr. Peter Espenshade**, peter.espenshade@jhmi.edu, 443-287-5026.

Course Director

Advisor

Thesis Committee

BC Faculty, Department Director

Your Fellow Students (conference rooms available)

Student Assistance Program
<http://www.jhsap.org/services/>

The Johns Hopkins University Student Assistance Program (JHSAP) is committed to assisting students in managing the challenges they face during their academic careers. JHSAP provides support to students in dealing with personal, academic, and relationship problems

Assessment of your current concerns

Brief, supportive counseling

Referral to appropriate and accessible community services and resources

Consultation that supports academic and/or professional development

Immediate support and management for crisis situations

Dean, Faculty, and Staff consultations

Risk assessment for students

Training, education, and outreach

For more information, to schedule an appointment, or to speak with an after-hours on-call clinician, call (443) 287-7000 or (866) 764-2317 (toll free)