

Graduate Program in Biological Chemistry Johns Hopkins School of Medicine

Program Overview

The graduate program in Biological Chemistry focuses on teaching a rigorous scientific approach to biomedical research. Research projects in the program investigate the biomedical, genetic, and molecular basis of a variety of disorders and diseases while probing the fundamental properties of molecules and cells. The Biological Chemistry faculty members investigate the biochemical mechanisms underlying a great variety of normal biological processes. Our interests span neurobiology, immunology, cellular and developmental biology, glycobiology, protein structure and folding, signal transduction, proteomics, and metabolism. We also study pathologies arising from abnormalities in these processes, such as cancer, pain, neurodegeneration, infectious disease, diabetes, and obesity. The Biological Chemistry (BC) program offers a highly flexible and personalized training environment in which there is significant personal interaction with the faculty.

Year 1 BC Program Requirements

- 1) Foundations of Modern Biology Core Course
- 2) 4th Quarter Electives
- 3) Topics in Biological Chemistry
- 4) Research Ethics and Professional Development
- 5) Laboratory Rotations (typically up to three)
- 6) Monday Noon Journal Club
- 7) Weekly Departmental Seminar Series (Tuesday noon seminar or equivalent)
- 8) Thursday Evening Dinner Symposium
- 9) BC Graduate Student Colloquium

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 three 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.

Rotation 1: August 25th - October 17th (8 Weeks)

Rotation 2: October 20th - December 9th (9 weeks)

Rotation 3: January 5th - March 6th (9 weeks)

Optional 4th Rotation: March 16th - May 16th (9 weeks)

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 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.

There are several avenues for completing training.

Course	A	B	C	D	E	F	G	H	I	Face to Face
Citi Course (Online)	✓	✓	✓	✓	✓	✓	✓	✓	✓	No
PH: 550.860	✓	✓	✓	✓	✓	✓	✓	✓	✓	No
Intro to Research Ethics (1)	✓	✓	✓	✓						Yes
Intro to Research Ethics (2)					✓	✓	✓	✓	✓	Yes
Rewards Workshops Topics A, B &E	✓	✓			✓					Yes
Rewards Workshops Topics D & H				✓				✓		Yes
Rewards Workshops Topics C			✓							Yes
Rewards Workshops Topics I									✓	Yes
Rewards Workshops Topics G							✓			Yes
Animal Care and Compliance						✓				No
Dean's Research Integrity Lecture Series	✓	✓	✓	✓	✓	✓	✓	✓	✓	Yes

- Dean's Research Integrity Lecture Series: Cover topics A-I in 9x90 minute seminars that include a discussion between the speaker, a panel of experts and the audience. You would have to attend all 9 lectures to fulfill your training, as your training must cover topics A-I.
- **Intro to Research I and II, is the most time efficient approach to fulfilling your research ethics training.**

Monday Noon Journal club (weekly) Each week, a student or postdoc in the Department presents a paper from the literature for discussion. All Departmental members attend and contribute to the discussion. BC students must attend all years but do not begin presenting until year 2

Tuesday seminar series or equivalent (weekly) BC students are expected to attend a at least one weekly seminar series in the School of Medicine. Most students will attend the BC Department's Tuesday Noon Seminar series. However, another regular seminar series can be substituted with permission of the Program Directors. 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.

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.

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.

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) Doctoral Board Oral Exam
- 4) Monday Noon Journal Club
- 5) Weekly Departmental Seminar Series (Tuesday noon seminar or equivalent)
- 6) Thursday Evening Dinner Symposium
- 7) BC Graduate Student Symposium

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 three elective courses in addition to the three 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, selected by the Graduate Program. 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. 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. Once the DBO Committee is selected, it is the student'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.

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.

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.

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.

Monday Noon Journal Club Years 2 and later Beginning in the second year, students will be scheduled to present a paper at the Monday Noon Journal Club. On average, each student will present once every three years. Students select a paper from the literature, to be approved for suitability by an assigned BC faculty member. At least one week prior to the journal club, the student meets with the faculty member to discuss the paper and the strategy for presentation of the journal club.

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) Thesis Proposal and First Thesis Committee Meeting
- 3) Electives (if requirements not yet fulfilled)
- 4) Monday Noon Journal Club
- 5) Weekly Departmental Seminar Series (Tuesday noon seminar or equivalent)
- 6) Thursday Evening Dinner Symposium
- 7) BC Graduate Student Colloquium

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 which should be delivered to the members of the thesis committee at least one week prior to the meeting.

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.

Progress Report: 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 – 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 (attached) 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) _____
Name (Chair) Signature

2) _____
Name Signature

3) _____
Name Signature

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 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 Directors: **Stephen J. Gould** (sgould@jhmi.edu, Physiology 409, 443-847-9918) and **Natasha Zachara** (nzachara@jhmi.edu, WBSB 408, 410-955-7049)

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

Office of Graduate Student Affairs and/or Associate Dean for Graduate Students. **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)