

# Student Handbook

## Graduate Program in Biological Chemistry

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## **I. Introduction**

The Graduate Program in Biological Chemistry (GPBC) is designed to train the next generation of independent research scientists, while simultaneously supporting the professional development and career choices of all our students. The core of our Ph.D. granting program is learning through research, augmented by an advanced curriculum, supportive mentorship, professional development, and career training. GPBC's focus on discovery-based education is consistent with the founding of Johns Hopkins as the country's first research university and its current position as one of the world's preeminent research universities.

### **Knowledge for the World**

Johns Hopkins University is committed to an international scope and reach. Consistent with this mission, the GPBC program recruits students from around the globe, maintains a diverse student body, and is committed to open publication of its discoveries.

### **Excellent Training, Outstanding Careers**

Our students graduate promptly (time to degree of 5-6 years) and have an unparalleled record of career success. Although our primary mission is to train the next generation of independent research scientists, we support the career goals of our students, whatever they may be. Career tracking of our graduates shows that:

- **40%** of our graduates hold tenure-track or equivalent positions
- **40%** of our graduates hold other research positions in biotech, pharma, etc.
- **20% achieve** success in other career paths, including science consulting, biotech/pharma management, science administration, policy, publishing, etc.
- **97%** of our graduates are in jobs that require a doctoral degree

### **Diverse Opportunities**

The GPBC offers our students exciting research training opportunities that reflect the breadth of modern biochemistry, including:

- metabolism & bioenergetics
- miRNA biogenesis & function
- host-pathogen interactions
- bacterial cell biology & cell division
- neurobiology & neuronal dysfunction
- mass spectrometry of proteins & metabolites
- signaling & gene expression
- immunology
- cancer
- cytoplasmic glycosylation & stress responses
- nuclear structure & gene regulation
- cell polarity & migration
- lipid metabolism & enzymology
- pain & inflammation
- exosome biology and exosome-based therapeutics

## A Tradition of Excellence

Our current research programs continue a tradition of research excellence that stretches from 1908 to the present and includes numerous landmark discoveries, including:

- mitochondrial ATP production (Lehninger)
  - mechanisms of enzyme catalysis (Hellerman)
  - enzymatic carboxylation (Lane)
  - tau & neurodegeneration (Cleveland)
  - cytoplasmic protein glycosylation (Hart)
  - water channels, for which **Peter Agre received the 2003 Nobel Prize**
  - HIF-1a & oxygen sensing, for which **Greg Semenza received the 2019 Nobel Prize**
  - TRP channels in sensory biology (Montell, Caterina)
- .....and many other breakthroughs

## II. Training Missions of the GPBC

The GPBC has four overlapping training missions:

1. To train the next generation of independent research scientists.
2. To provide all GPBC students with extensive, hands-on experience and education in mechanistically-oriented biomedical research that is required for a wide variety of academic and non-academic careers in biomedical research and various supporting careers.
3. To facilitate the transition of our students from consumers of received knowledge to producers of novel scientific understanding.
4. To facilitate the future success of GPBC graduates, regardless of their career path.

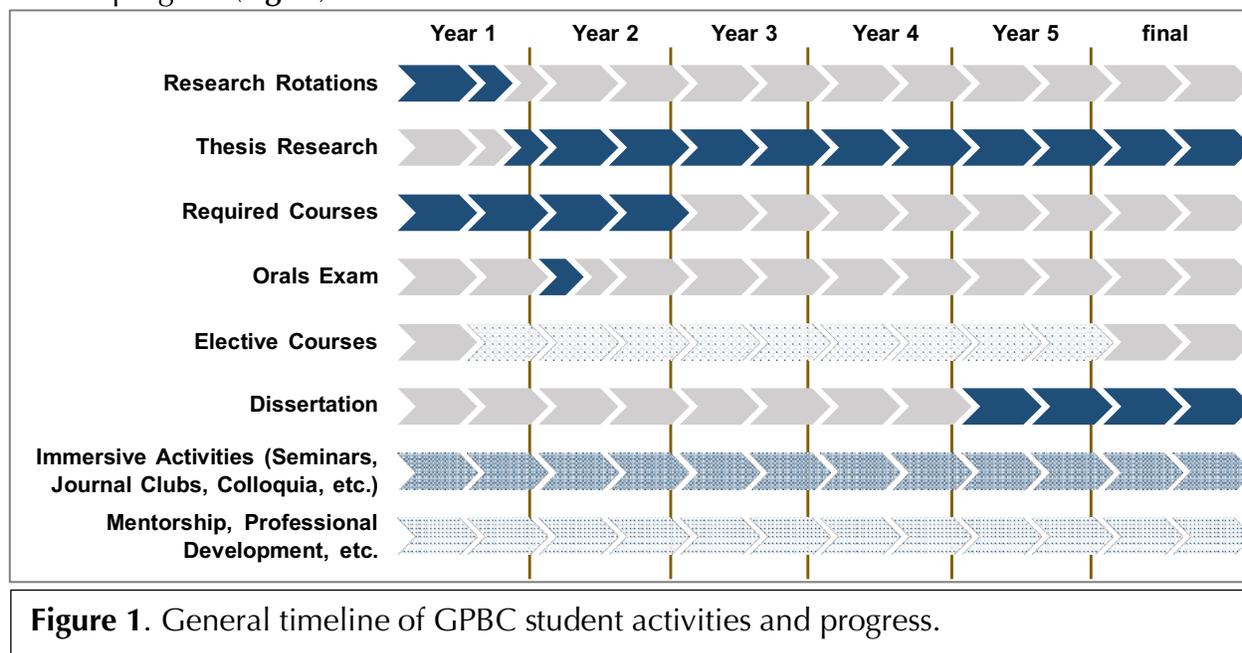
## III. Curriculum Overview

The training missions of the GPBC are achieved through a four-component curriculum that is rooted in discovery-driven education and augmented by outstanding courses, mentorship, and career training:

- **Research.** The GPBC is based on discovery-driven education in which students pursue their thesis studies under the direction of world-class research faculty, augmented by a diverse array of immersive scientific activities.
- **Courses.** GPBC students complete a rigorous set of graduate-level courses that equip them with the knowledge needed for their thesis research.
- **Mentorship.** The GPBC enhances student success by connecting each student with a multidimensional network of supportive faculty, including their rotation advisors, thesis advisor(s), co-mentor, Thesis Committee members, and GPBC Director.
- **Professional development and career training.** The GPBC assures that its students have access to multiple career development training opportunities established by the GPBC and by the School's Professional Development Office (PDO).

## IV. Steps to the Ph.D.

Each student's path to the Ph.D. is unique. Nevertheless, there is a common timeline of student progress (*Fig. 1*).



- Research is the primary activity of GPBC students. Research starts immediately upon matriculation with a series of research rotations, and thereafter continues in their thesis studies.
- Required courses in the first 9 months ensure that all students possess a solid foundation in molecular life sciences.
- Students also engage in immersive scientific activities (seminars, journal clubs, colloquia, scientific meetings, etc.). Students are required to attend events sponsored by the Department of Biological Chemistry and are encouraged to attend those sponsored by other departments of the school and university.
- Students complete their research requirement by publishing their dissertation. Students are also highly encouraged to publish their research in peer-reviewed articles, reviews, etc.
- The GPBC directly supports the professional development of its students by providing:
  - outstanding, mechanistically-oriented research training
  - multidimensional student mentorship
  - OPTIONS career training curriculum
  - the broad palette of career pathway, career development, and career readiness events run by Professional Development Office (PDO)

## Steps to the Ph.D., by year:

### Year 1:

- Student orientation day (day 1)
- Biological Chemistry Bootcamp (week 1)
- Participate in research rotations (3-4 rotations of 2 months-long duration each)
- Participate in immersive scientific activities (seminars, journal clubs, colloquia, interest groups, etc.), both required and elective
- Select thesis advisor/home laboratory & initiate thesis research
- Take and pass required first-year classes:
  - Biophysics
  - Organic Mechanisms in Biology
  - Molecular Biology & Genomics
  - Genetics
  - Cell Structure & Dynamics
  - Pathways & Regulation
  - 4th Quarter Elective I
  - 4th Quarter Elective II
  - Rigor, Reproducibility & Experimental Design in Biological Chemistry, Yr I
- Take and complete Introduction to Responsible Conduct of Research (first year ethics training course)
- Participate in OPTIONS career development curriculum
- Participate in annual student review with the GPBC Director

### Year 2:

- Thesis research
- Participate in immersive scientific activities
- Write a thesis proposal
- Take and pass the Doctoral Board Orals exam
- Take and pass the required second-year class:
  - Rigor, Reproducibility & Experimental Design in Biological Chemistry, Yr 2
- Participate in OPTIONS career development curriculum
- Form a thesis committee and identify a co-mentor
- With the thesis advisor, draft and sign an individual development plan (IDP)
- Participate in Thesis Committee meeting & GPBC Director meeting

### Years 3, 4, & 5:

- Thesis research
- Publish papers, and possibly their dissertation
- Participate in immersive scientific activities
- Take and pass any remaining elective classes
- Annually: update the IDP & participate in Thesis Committee & Director meetings
- Work with mentors to develop/implement a career plan

**Above 5 years:**

- Thesis research, with an emphasis on prompt graduation
- Publish the dissertation and peer-reviewed articles, with an emphasis on prompt graduation
- Participate in immersive scientific activities
- Hold Thesis Committee meetings & GPBC Director meetings every 6 months
- Implement the career plan

**V. Expectations****The GPBC expects the following of its students:**

1. To commit 100% of their effort to graduate studies
2. To make research their top priority
3. To take and pass all required and elective courses
4. To take and pass the Doctoral Board Orals examination
5. To publish their research findings in a dissertation, and to make a good-faith efforts to publish their research in peer-reviewed articles
6. To actively participate in immersive scientific events (departmental and other seminars, journal clubs, colloquia, etc.), both required and elective
7. To participate in annual student review events (Thesis Committee meetings, GPBC Director meetings, Individual Development Plan)
8. To adhere to all policies and guidelines of the GPBC, the School of Medicine, and Johns Hopkins University
9. To take and participate in the Professional Development Office's OPTIONS career training curriculum
10. To take an active role in their own professional development and career training

**The GPBC expects the following of its faculty preceptors:**

1. To meet regularly with GPBC students to review their research progress, academic progress, career development, and overall well-being
2. To establish and maintain an appropriate teacher-learner relationship
3. To strive to mentor each student in a way that enhances the student's research productivity, academic progress, and professional development
4. To educate students in the breadth of the scientific enterprise
5. To report any significant student-related academic, professional, or personal concerns to the GPBC Director
6. To contribute to GPBC program activities and administration

## VI. Requirements for the Ph.D.

Requirements for the Ph.D. are:

1. Perform original scientific research of acceptable quality throughout the duration of their studies
2. Engage in immersive scientific activities (seminars, journal clubs, colloquia, etc.), both required and elective.
3. Take and pass (B- or better) all of the first year required classes
4. Take and pass 6 elective classes (including two 4th Quarter Core Electives)
5. Take and pass the GPBC-specific class
6. Take and pass the Doctoral Board Orals exam
7. Participate in the PDO OPTIONS career training program
8. Take and pass required Introduction to Responsible Conduct of Research (ethics training course)
9. Hold a final meeting of the Thesis Committee
10. Hold a public thesis defense (an oral presentation of their research findings)
11. Write a dissertation summarizing their research studies, have it read and approved by the thesis advisor and a second faculty member, and publish the dissertation with the
12. Complete the above requirements within 9 years of matriculation

The above requirements encompass the university-wide requirements established by the Doctor of Philosophy Board of Johns Hopkins University, which are:

**1. Dissertation:** *All Ph.D. students must successfully complete a dissertation in accordance with relevant school and program guidelines prior to degree conferral.*

**2. Residence:** *All Ph.D. students must have completed two consecutive semesters of full-time study prior to degree conferral.*

**3. Oral Examination:** *All Ph.D. students must successfully pass a required oral examination conducted by five faculty members. The oral examination must include the chair and at least one other member from outside the candidate's home department.*

*It is university policy that all program and university requirements for the Ph.D. must be completed in 9 years or less from start of the doctoral program. The Doctor of Philosophy Board reviews all candidates for the Ph.D. prior to conferral to ensure that the fundamental requirements for the Ph.D. have been met within the timeframe delineated.*

## VII. Thesis Research

The core of the GPBC program is **discovery-driven education**, and in accord with this principle, the GPBC established the following guidelines for student research experiences:

- 1. Rotation Research.** Upon matriculation, GPBC students will engage in a series of research rotations of approximately 2 months each (we recommend 3 and allow up to 4). The twin goals of research rotations are to (i) educate students in the breadth of the scientific enterprise by providing them with direct experience with multiple research projects, experimental systems, laboratories, and mentors, and (ii) provide students with direct, personal experiences that can lead to a more informed match of student and thesis advisor.
- 2. Thesis Research.** Thesis research is the single most important component of the GPBC curriculum. For it is the process that can convert the promising young students that enter our program into the independent biomedical research scientists that graduate from our program. Thesis research is extremely rewarding for student and advisor alike. However, students should recognize that it often involves substantial technical and conceptual obstacles, years of effort, and the need for each student to face and overcome their limitations, whatever they may be.
- 3. Publication.** GPBC students must communicate their findings by publishing them as a dissertation with the Welch library of Johns Hopkins University. GPBC students are also highly encouraged to publish their findings in peer-reviewed research articles, reviews, book chapters, and other forms of communication.

## VIII. Courses

Success in thesis research success requires a substantial body of biomedical knowledge and understanding. To ensure that all students are provided with this knowledge and understanding as soon as possible, the GPBC requires that all students take and pass (B- or better in graded classes) the following:

### Year 1.

1. Foundations Curriculum (M, Tu, Th, F, 9:00-10:30AM)
  - a. Biophysics of Macromolecules
  - b. Organic Mechanisms in Biology
  - c. Molecular Biology
  - d. Genetics I & II
  - e. Cell Structure & Dynamics
  - f. Pathways & Regulation
2. Rigor, Reproducibility and Experimental Design in Biological Chemistry (Wednesday, 9:00-10:30)
3. Introduction to Responsible Conduct of Research (Monday, 2:00-3:30PM)
4. 4th Quarter Elective I (April block; various topic options)
5. 4th Quarter Elective II (May block; various topic options)
6. OPTIONS (career development)

## Year 2.

- |   |                         |
|---|-------------------------|
| 1. Rigor, Reproducibility and Experimental Design in Biological Chemistry | (Wednesday, 9:00-10:30) |
| 2. OPTIONS  | (career development)    |
| 3. Electives  | student choice          |

## Years 3 and above.

- |              |                      |
|--------------|----------------------|
| 1. OPTIONS   | (career development) |
| 2. Electives | student choice       |

## **IX. Mentorship**

Student achievement is enhanced by strong mentorship. The GPBC provides students with several forms of proactive mentorship:

### **1. Early-stage mentorship**

Upon matriculation, students are mentored by a combination of the GPBC Director, rotation advisors, and upper year students, as our 1<sup>st</sup> year students do not yet have a thesis advisor:

- a. The **GPBC Director** conducts new student orientation, meets with students at the completion of their rotations, facilitates student consideration of potential thesis advisors, meets one-on-one with students in the summer of their first year to assess their progress, and is available for ad hoc discussion as needed by the students;
- b. **Rotation advisors** serve as daily laboratory mentors of students prior to selection of their thesis advisor; and
- c. **2<sup>nd</sup> and 3<sup>rd</sup> year students** meet with 1<sup>st</sup> year students in the first 6 weeks of the school year to discuss (i) strategies for 1<sup>st</sup> year students to navigate lab rotations, 1<sup>st</sup> year courses, and selection of the thesis lab; and (ii) strategies for 1<sup>st</sup> and 2<sup>nd</sup> year students to prepare for the Doctoral Board Orals exam.

### **2. Thesis Advisor**

Students select their thesis advisor within 9 months of entering the program. The thesis advisor provides continual mentorship to help students succeed in their research projects, to transition into independent research scientists, to craft a career development plan, and to support the student's career goals.

### **3. Thesis Committee**

All GPBC students must assemble a thesis committee before the end of their second year. Like the thesis advisor, the Thesis Committee has multiple mentorship roles that naturally focus on the student's scientific progress, but also extend to the student's professional development and personal well-being. Thesis Committees meet at least once a year in years 2-5, and twice a year thereafter.

#### **4. Co-mentor (Optional)**

Students must also select a co-mentor soon after selecting a thesis advisor. The role of the co-mentor is to provide students with a second faculty member with whom they can build a direct professional relationship and who can provide the student with scientific, personal, and/or culturally relevant mentorship that complements that of the thesis advisor.

#### **5. GPBC Director**

The GPBC Director provides student mentorship in several ways:

a. Prior to selection of a thesis laboratory, the GPBC Director is responsible for the overall mentorship of GPBC students (early stage mentorship)

b. The GPBC Director meets with all students every summer in annual, private, one-on-one meetings to discuss each student's scientific progress, professional development, progress to degree and personal well-being.

c. The GPBC Director is continuously available for ad hoc meetings with GPBC students to help them with personal and/or professional challenges they may be facing and wish to discuss.

d. The GPBC write letters of support for students' pre-doctoral and post-doctoral fellowships and scholarships, job applications, and other needs.

### **X. Professional Development and Career Training**

GPBC students enjoy access to a wide array of professional development and career training opportunities. These include but are not limited to the following:

#### **1. Research**

Rotation and thesis research within the GPBC provides our students with a discovery-based education that prepares them for a broad array of careers within and beyond scientific research and imbues our graduates with skills and abilities unique to those who have navigated the challenges of a world-class Ph.D. program.

#### **2. Courses & Immersive Events**

GPBC students attend didactic classes, seminars, journal clubs, symposia, colloquia, and other educational events that provide our graduates with the deep and broad array of scientific knowledge and understanding necessary for success in a broad array of careers.

#### **3. Mentorship**

The multidimensional mentorship program of the GPBC equips our students with close professional relationships with multiple faculty members (thesis advisor, co-mentor, Thesis Committee, GPBC Director) who can provide:

a. professional and personal guidance during each student's journey through graduate school

b. positive examples of success in academic research

c. letters of support for pre-doctoral fellowship and scholarship applications, as well as for post-doctoral fellowships and other job applications

d. a solid professional support network that our graduates can build on in subsequent stages of their careers.

#### **4. OPTIONS career training curriculum**

GPBC students are required to take the OPTIONS career training program run by the Professional Development Office within the School of Medicine. This multi-year curriculum exposes students to the diversity of career paths open to them, helps students access the training need to pursue their desired career, and provides key career readiness workshops.

#### **5. Participation in other PDO events**

The PDO sponsors a number of events and opportunities, and students are encouraged to investigate the palette of PDO offerings in:

##### Career Pathways:

- Academic research
- Industry research
- Business
- Science policy
- Regulatory affairs
- Administration
- Science communication
- Intellectual property
- Clinical research
- Teaching

##### Career Development:

- Career clinics
- Teaching academy
- Alumni career interviews
- Career panels
- Career communities
- Internships
- JHU-biotech/pharma mentor match program
- Career panels
- Finding a post-doc
- Academic job search

##### Career readiness:

- Grantsmanship
- Leadership training
- Information management
- Communication
- Writing & speaking skills
- Professional development courses

## XI. Personal Assistance

Graduate school is a challenging experience, and most students will need the support of faculty, university staff and support programs at one or more times during their journey through graduate school. The GPBC recommends that students take advantage of the following resources whenever they have questions or concerns of a either a professional or personal nature.

**GPBC Director:** Dr. Stephen J. Gould ([sgould@jhmi.edu](mailto:sgould@jhmi.edu)), 443-847-9918, Phys. Bldg. rm 409) The GPBC Director is available to help students address their concerns, whether professional or personal, and can always be reached through the provided contact information.

**GPBC Administrator:** Darlene Sutton ([dsutton5@jhmi.edu](mailto:dsutton5@jhmi.edu)), 410-955-3086, Phys. Bldg. rm 612) is available to help students with all administrative challenges, including scheduling, paperwork, and visa matters. The GPBC Administrator also tracks student progress and maintains records of all student DBO exams, thesis committee meeting, and annual IDPs.

**GPBC Associate Director:** Dr. Ryuya Fukunaga ([fukunaga@jhmi.edu](mailto:fukunaga@jhmi.edu)), 410-955-3790, Phys. Bldg. rm 521a) works closely with Dr. Gould to manage the program and is also available to help students with any problems they may encounter.

**Thesis Advisor:** The student's thesis advisor is their primary mentor and is often the first person that students turn to for help with their questions and concerns.

**Co-mentor:** The student's co-mentor is selected, in part, to provide each student with whatever professional, personal, or culturally relevant mentoring best meets the student's needs.

**Thesis Committee faculty:** Students can also turn to members of their Thesis Committee, who can be particularly helpful due to their understanding of the student's project and progress.

**Director of the Department of Biological Chemistry:** as Director of the Department, Dr. Michael Caterina, is uniquely positioned to help students with particularly sensitive matters that may arise.

**Rotation Advisors:** Prior to selection of a thesis lab, each student's rotation advisor is an outstanding resource for addressing issues that may arise.

**Biological Chemistry Faculty:** Students may turn to any BC faculty for help in addressing questions, problems, or concerns.

**Fellow students:** Student peers can provide unique insights and guidance regarding the challenges of graduate school and navigating university administration.

**Associate Dean for Graduate Biomedical Education:** Dr. Peter Espenshade ([peter.espenshade@jhmi.edu](mailto:peter.espenshade@jhmi.edu)); 443-287-5026; Phys. Bldg., rm 107B) is a key contact who has extensive understanding of the issues faced by graduate students and is an outstanding source of information and advice.

**Vice Dean for Education:** As the person ultimately responsible for all educational activities within the School of Medicine, Dr. Roy Ziegelstein ([rzeigel@jhmi.edu](mailto:rzeigel@jhmi.edu)), (410)-550-0523) is another resource for student questions and concerns.

**Mistreatment:** Learner mistreatment will not be tolerated. Students who wish to report an instance of mistreatment that they have either experienced or observed have multiple options. **In case of emergency, always call 911.**

- **If a student wishes to report** an instance of mistreatment, they can do so by:
  - Reporting it directly to the Office of Institutional Equity ([oie.jhu.edu](http://oie.jhu.edu))
  - Reporting it to ANY faculty member or other 'responsible employee' of the University, including mentors, co-mentors, program directors, department directors, and senior administrative staff. Students should know that these individuals have an absolute obligation under Johns Hopkins University policy to notify OIE of any instance of sexual harassment, violence, or discriminatory behavior based on ethnicity, sex, religion, sexual orientation, gender, or other protected status.
  
- **If a student does NOT wish to report it, or is unsure of what reporting might entail**, please make use of the information available at **mistreatment-reporting.med.jhmi.edu**. Also, consider contacting confidential resources (<https://oie.jhu.edu/confidential-resources/>), which include Safe at Hopkins ([safeathopkins.org](http://safeathopkins.org)), JHU Sexual assault helpline ([sexualassault.jhu.edu](http://sexualassault.jhu.edu)), or the **Johns Hopkins Student Assistance Program (JHSAP)**, which can be reached online at <http://www.jhsap.org/services/> or by phone at (443) 287-7000. JHSAP is a life management resource that can help you identify and manage challenging issues in healthy ways. JHSAP services are free and confidential, and there is no limit to the number of times you may access services during your academic career. Your spouse, partner, or child may also access JHSAP services. Services include:
  - Short-term counseling
  - Crisis response
  - Healthy relationship support
  - School-life coaching and adjustment
  - Educational workshops
  - Dean, faculty, and staff consultations

## **XII. Policies**

Students must adhere to all Johns Hopkins University policies (<https://www.hopkinsmedicine.org/som/education-programs/graduate-programs/academics/academic-resources/policy-finder.html>), as well as all program-specific policies.

### **A. Research**

- Students must adhere to all rules and guidelines related to the ethical conduct of research and act in accordance with the good research practices established by their faculty advisor.
- Students must adhere to data management plans of the laboratories in which they work.
- Students must select their thesis advisor within 9 months of matriculation.
- Students are expected to devote the vast majority of their effort to their thesis research, including whatever amount of time is required maintain substantive progress.
- Students are expected to devote ~50% or more of their time during research rotations to laboratory research.

### **B. Courses**

- Students are expected to take and pass all required courses (B- or better in graded classes).
- Students that fail one of the 6 required 1<sup>st</sup> year classes must re-take and pass the class in their second year.
- Students that fail two of the 6 required 1<sup>st</sup> year classes may be dismissed from the program.
- Students must also take and pass 6 elective classes, including one in each of their 3<sup>rd</sup> quarter core electives.
- Students that fail an elective class must re-take the class and pass it in the following year.
- Students that fail two elective classes may be dismissed from the program.

### **C. Immersive Scientific Activities**

- Students are required to attend Departmental seminars, journal clubs, interest groups, colloquia, retreats, and other events, including:
  - Departmental seminar (held Tuesdays at noon)
  - Laboratory Research Symposia (held once a month)
  - Department Retreat (annual, in September)
- Students are encouraged to attend seminars, journal clubs, and colloquia organized by other Departments, Institutes, Divisions, and Schools.

#### D. **Doctoral Board Oral (DBO) Examination**

- The Doctoral Board Orals (DBO) examination will be held in the first quarter of the second year (usually Oct-Nov.).
- The DBO exam will consist of questions that probe the students' depth and breadth of knowledge in topics covered by the six 1<sup>st</sup> year core courses:
  - i. Biophysics of Macromolecules
  - ii. Organic Mechanisms in Biology
  - iii. Molecular Biology
  - iv. Genetics I & II
  - v. Cell Structure & Dynamics
  - vi. Pathways & Regulation
- The Doctoral Board Oral examination will be administered by five faculty. In regard to the composition of the oral exam committee, it is highly recommended that the committee be comprised of two faculty from within the department and three from outside the department, but it is also acceptable that the committee be comprised of three faculty from within the department and two from outside the department. The Chair of the DBO examination committee will be the most senior member from outside the department. Faculty with joint appointments in the department are considered "inside faculty". At least two external faculty should hold the rank of Full or Associate professor. Committees must be selected and approved 2 months prior to the exam date.
- Students will submit a **thesis proposal** to members of the DBO examination committee one week prior to the exam.
- **DBO Format:** Typically, the exam begins with the student standing at a whiteboard giving their thesis proposal. Although the exam will likely not focus on this project, this introduction (and the written thesis proposal) 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.
- **Possible Outcomes:** There are three possible outcomes of the DBO:
  - Unconditional Pass – the student has answered the Committee's questions to the Committee's satisfaction and is eligible to continue towards their thesis.
  - Conditional Pass – The student's performance is generally satisfactory, but there are one or two areas in which the student displayed significant weakness. Under these circumstances, the Committee must clearly define the weakness(es) and provide a clearly articulated set of actions that the student must follow in order to pass the exam. Possible conditions include but are not limited to: (a) being asked to write a mini-review on a particular topic or broad area, or (b) being asked to meet in person with one or more Committee members to demonstrate an understanding of the deficient area. Once the Committee member(s) are satisfied that the Condition has been met, the conditional pass will be changed to a pass.
  - Fail – If the student's performance in the DBO exam is generally deficient, 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 GPBC

Director. The student must pass the re-examination in order to remain eligible to continue in the Graduate Program.

### **E. Thesis Proposal**

The thesis proposal should be 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 proposal should be divided into the following sections:

- i. Specific Aims – A concise listing of two to four specific aims.
- ii. 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?
- iii. Innovation – What are the innovative aspects of the hypotheses to be tested and/or the experimental approaches to be employed?
- iv. 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.
- v. References

The thesis proposal should be no longer than 10 pages, and the scope 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.

### **F. Thesis Committee**

Thesis Committee meetings offer students the opportunity to draw on the expertise of the 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 after passage of the DBO exam, and no later than the end of the second year. The Thesis Committee must meet a minimum of once per year in the 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> years. The Thesis Committee must meet at least once every 6 months in all subsequent years. In the event that a student changes thesis lab, the first thesis meeting must be held no later than 6 months after joining the new lab. The student, new thesis advisor, and GPBC Director will formulate a revised timeline for completion of degree based on circumstances.

**Composition:** The Thesis Committee is comprised of a minimum of **four (4) faculty-level scientists**, one of whom is the student's thesis advisor. All students must also select a faculty **co-mentor**. The co-mentor must attend all meetings of the Thesis Committee, but does not necessarily have to be an official member of the Thesis Committee (students may wish to select a co-mentor on the basis of their ability to provide personal or culturally relevant mentoring, and whose academic expertise may therefore lie in an unrelated

discipline, making formal inclusion on the Thesis Committee impractical). Non-JHU faculty may serve on the Thesis Committee, pending approval of the GPBC Director. The Thesis Committee shall also include the GPBC Director in all years above the 5th.

**Progress Reports:** Prior to each thesis committee meeting, the student will update their thesis proposal in the form of a progress report. The progress report will be submitted to the Thesis Committee members no less than one week prior to the meeting. The progress report shall describe their progress, technical challenges, and future directions. A suggested format is below:

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

**Meeting Format:** The meeting will start without the student, and the advisor will provide the committee with an overview of the student's progress toward the Ph.D.. This provides the advisor with an opportunity to notify the committee of issues of particular concern regarding the student. The student will then join the committee and give a slide presentation outlining their proposal and progress. The Committee and the student will discuss the results to date, challenges, and next steps. 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.

Once the scientific portion of the Thesis Committee meeting is complete, the Committee will strive to obtain a sense of how the advisor-student team is functioning by meeting in private with the student to give them an opportunity to express their view of student-advisor relationship and ways to improve it in the following year. They will then bring the advisor back into the meeting, followed by a final discussion of student progress, well-being, and career preparations and planning.

At the end of each meeting, the Chairperson will fill out the Thesis Committee meeting form (see pages 22-23), 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. If the Thesis Committee has the sense that there are problems that rise above those considered part of an expected training process and reasonable advisor-student relationship, the Thesis Committee **must** bring them to the attention of the GPBC Director

**Recommended Goals for Thesis Meetings:**

Meeting #1 (year 2) should evaluate the progress report, future directions, presentation quality, general well-being of the student, and the student's career plans. The committee must provide their feedback to the student advisor in both verbal and written form.

Meeting #2 (year 3) Same as year 2. In addition, **the student should be showing demonstrable progress**, either by scientific advances or by demonstration of substantive experimental interrogation of a complex assay or process.

Meeting #3 (year 4) Same as year 3. In addition, the student must submit a written **thesis completion plan** as part of their progress report.

Meeting #4 (year 5) Same as year 4. In addition, **the student will have completed all courses and certifications necessary for graduation**, the student should have completed at least 50% of the research requirement for the degree, and the student should demonstrate significant progress in developing their career plan.

Meetings beyond year 5 will be held every 6 months and cover the same material covered in prior meetings. In addition, the student must show that they are nearing completion of their thesis research, are working on their dissertation, and are starting to implement their career plan.

### **G. Individual Development Plan (Requirement)**

Students and their thesis advisor are required to meet annually to complete and update an individual development plan, which must be signed by both the advisor and student. This meeting must take place prior to their first Thesis Committee meeting and result in completion of the accompanying IDP form (see 'Annual Progress Evaluation and Mentoring Plan' form included at the end of this handbook). The resulting document provides clear instructions for development of the plan and completing the document. The completed document must be submitted to the GPBC Administrator each year.

### **H. Training & Certification**

Students must complete all required training certifications, including:

- Research Ethics I must be completed by the end of year 1
- Research Ethics II must be completed by the end of year 2
- Modules required of students involved in:
  - Use of radioactive materials
  - Animal subjects research
  - Human subjects research
  - Use of specialized core facility instrumentation

### **I. Vacations & Sick Leave**

- Year 1: All scheduled University holidays in the 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> quarter, plus up to two weeks in the 4<sup>th</sup> quarter.
- Year 2: Students may take up to 3 weeks of vacation.
- Students shall coordinate their vacations with their thesis advisor to minimize the disruption of research progress.
- Students may not take a vacation during a course in which they are enrolled.
- Students may take up to 15 calendar days of sick leave per year, but sick days must be documented with their rotation or thesis advisor. Sick leave does not accrue between years.
- Students may take a leave of up to 30 calendar days per year for birth of a child or adoption of a child.

## **J. Leave of Absence**

Students may be placed on a leave of absence under the following conditions:

- A student may request a medical leave of absence for a **duration of up to one year, but no longer than one year**. This request must be submitted in writing to the GPBC Director, and must be accompanied by a physician's documentation, as well as a projected timeline of return.
- If granted, medical insurance will be provided by the university for the duration of the leave of absence.
- Failure to return from a medical leave of absence within one year will result in dismissal from the program.
- The GPBC Director may place a student on an involuntary leave of absence if it is believed to be in the health interests of the student.
- Students will not receive a stipend during their leave of absence.
- Students will not be able to use on-campus facilities during their leave of absence

## **K. Withdrawal**

A student may withdraw from the GPBC program by:

- notifying the GPBC Director in writing of their intention to withdraw
- attending an in-person meeting with the GPBC Director at which they verbally express their desire to withdraw from the program
- submitting a second letter of withdrawal one week later

If the student has yet to complete their 1<sup>st</sup> year courses or pass their DBO examination the student will be dismissed from the program without a degree of any kind.

If the student has (a) passed their 1<sup>st</sup> year required courses and (b) passed their DBO examination, the student may be awarded a Master's degree, provided that:

- they submit a written request to the Administrator of the GPBC asking for the awarding of a Master's degree;
- submit a concise master's thesis that describes their research efforts;
- the submitted Master's thesis is deemed acceptable by the GPBC Director and one additional member of the GPBC faculty

## **L. Grounds for Probation or Dismissal**

The GPBC Director may place a student on probation for refusal to adhere to GPBC mentoring policies, or for serious violations of any program, school, or university policy.

Continued failure of a student to remediate the underlying cause of the probation will result in their dismissal from the program.

Students will also be dismissed from the program for:

- Failure to pass the Doctoral Board Oral examination on the first or second attempt.
- Failure to pass two (2) or more of the following six core classes in the first year:
  - i. Biophysics of Macromolecules

- ii. Organic Mechanisms in Biology
  - iii. Molecular Biology
  - iv. Genetics I & II
  - v. Cell Structure & Dynamics
  - vi. Pathways & Regulation
- Failure to pass any failed class on the second attempt
  - Persistent lack of satisfactory performance in rotation or thesis research





## Annual Progress Evaluation and Mentoring Session

The purpose of this session is to outline a plan of progression and overall career development. This form provides a framework of what to discuss. Each student and mentor should tailor the conversation to your needs.

Note: The student or the mentor may request to have this meeting in the presence of a third party, e.g., a member of the thesis committee, co-mentor, etc..

Student Name:

Mentor Name:

Arrival date in the lab:

Date of Meeting:

Year of Study:

Prepared by:

### Instructions

**To students:** Please read and answer the following questions in a few sentences before coming to your annual progress evaluation and mentoring session.

**To mentors:** Please answer the relevant sections below (indicated by an asterisk), before the annual progress evaluation and mentoring session with your student.

- Be honest and forthright; this document is to be used for exchange of suggestions and advice, and this information will be treated as confidential.
- If you completed this last year, start by reviewing the last action plan you developed.
- Discuss your answers on this year's form and review the progress made.
- Develop an action plan for the upcoming year.

Please keep copies of both original, signed forms and your final action plan for your records, and send a copy to the GPBC Administrator, Ms. Darlene Sutton.

### A. Your Project and Your Progress

1. What is the long-term goal of your project? How does it fit into the overall goals of the lab?

(\* For mentors: What is the long-term goal of the student's project? How does it fit into the overall goals of the lab?)

2. Describe your experimental and professional accomplishments from last year.

(\* For mentors: Describe the student's experimental and professional accomplishments from last year.)

3. Have you properly catalogued all of your primary data in a manner that could be assessed by your mentor and other individuals working on the project?  
(\*For mentors: Do you routinely examine the primary data generated by the student and do you know how to find it?)
4. What are some of the challenges and limitations you encountered over the last year? Are you satisfied by your level of progress?
5. What are your experimental goals for the next twelve months? How will you accomplish these goals? Are there new techniques you would need to learn to accomplish these goals?  
(\* For mentors: What are your experimental goals for this student for the next twelve months? What would the student need to accomplish these goals?)
6. Did you participate in writing a manuscript?
7. What are your plans for publications?  
(\* For mentors: What are your plans for this student's publications?)
8. Have you applied for pre-doctoral fellowships?
9. Have you attended a scientific meeting to present your data?

## **B. Mentoring**

Please write in the first person and use specific examples.

1. Are you satisfied with the feedback you are getting from me? Are there any changes that you would like to see in the frequency or the format in which I give you feedback?
2. Name at least one thing that I, as your mentor, could do better that would help you.  
(\* For mentors: Name at least one thing that you, as a mentor, could do better that would help the student.)
3. Name at least one strength that you bring to your project or the overall goals of the lab.  
(\*For mentors: Name at least one strength of the student.)
4. Name at least one thing that you as a trainee could do better.  
(\* For mentors: Name at least one thing that the student could do better.)
5. Name at least one area in which you as a trainee have improved in the last year (e.g., time management, public speaking, negotiation, planning for the future).  
(\* For mentors: Name at least one area in which the student has improved in the last year.)

### **C. The Lab Environment**

1. Describe your view of the lab's future direction(s).  
(\* For mentors: Describe your view of the lab's future direction(s).)
2. Do you have concerns about the lab? Do you have any suggestions for how the lab could run better or more smoothly?  
  
(\* For mentors: Do you have concerns about the lab? Do you have any suggestions for how the lab could run better or more smoothly?)
3. Do you have any other concerns about your training?

### **D: Long Term Career Goals.**

1. Have you completed your course requirements?
2. How will you continue to enrich your education (e.g., participate in Journal Clubs, take other courses, TA, etc.)?
3. When do you hope to graduate? If you are close to graduation, what do you need to accomplish to graduate?  
(\*For mentors: When do you expect the student to graduate?)
4. Have you used the website myIDP (<http://myidp.sciencecareers.org/>) or other similar site? Have you found that helpful? Is there anything that you have learned from that exercise that you wish to discuss?
5. What are your long-term career goals?
6. In addition to carrying out your project, what are your professional goals for the next twelve months? For example, are you planning on attending a scientific meeting or taking a professional development course, (see opportunities at <http://www.jhu.edu/~pdo/> and <http://bci.jhmi.edu>)?
7. Have you thought about which two people you will request reference letters from (for postdoc, job, fellowships) in addition to your advisor?
8. Do you plan to apply for postdoctoral training and postdoctoral fellowships?
9. Do you have interest in doing an internship?

### **E. Develop an action plan**

Based on your responses above, develop an action plan outlining project specific and professional development goals with an associated timeline.