The Biomedical Engineering PhD Program at Johns Hopkins University

Program Handbook
Updated: August 2022
Welcome to the Biomedical Engineering PhD Program at JHU

Welcome to the PhD program in Biomedical Engineering at Johns Hopkins University. JHU launched one of the first BME PhD programs in the nation in 1961. The program was started within the School of Medicine, and our strong connection to clinical practice and translation continues to this day. Home to one of the longest continuously-running NIH-supported training grants, and highly-ranked for decades, the program has grown to become the largest doctoral program at JHU.

At JHU BME, students have the opportunity to not only be part of, but to lead new world-class, cutting-edge research with clinical collaborators. While here, students build new tools, discover new knowledge, develop new diagnostics and treatments, and continue the program’s long history of impact on biology and medicine. And from here, our trainees go on to be leaders in academia, industry, government regulation and policy, and more.

While at JHU, students also have the opportunity to take advanced and innovative classes in medicine and engineering taught by world subject area experts. Students get hands-on instruction with emerging tools and techniques, and gain experience teaching and mentoring others.

As co-directors of the program, it’s our job to make sure that the priorities of the program and its academic curriculum are optimal for the success and training of our students. If you have suggestions for improvements to the program, let us know – we have made numerous changes in recent years to make the program better. We are also available to meet with individual students – just send us an email (BMEPhDCoDirectors@jh.edu) and we’ll set up a time to talk.

Our program management team is also available to discuss any aspects of the program, including admissions, registration, student advising, and much more. Send an email (BMEPhDTeam@lists.johnshopkins.edu) and make an appointment to chat.

JHU BME is a remarkable community of faculty, students, and staff; the members of our community are engaged, passionate, and supportive. Whether you are a student currently in our program, a prospective applicant interested in training with us, or an alum checking in on your alma mater – welcome! Contact us anytime. We’re happy to talk to you more about the program.
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Goals of the JHU PhD Program in Biomedical Engineering (BME)

In this program, students gain a deep and broad grounding in three key areas: Biology, Medicine, and Engineering (BME). By being fluent in the languages of these three areas, students can conduct interdisciplinary research and lead interdisciplinary teams.

While in the program, students will have the opportunity to engage in cutting-edge biomedical research of clinical relevance. Students work with research mentors that are leading (and in many cases creating) advanced research fields with real impact on patient health.

The program prepares students for post-graduation careers of their choice, including academia, industry, & governance. Our alumni have excelled in many fields, and our students can participate in external internships during the program.

The program also encourages students to consider the ethical and social implications of biomedical research.

Overview of your time as a BME PhD student at JHU

Every student’s journey is different, but the typical timeline through the PhD program through the PhD program is:

**Year 1** Research Rotations (if any), Academic Courses, BME Seminars, Ethics/RCR, IDP

**Year 2** Research, Teaching, DBO, Coating Ceremony, IDP

**Year 3** Research, Thesis Proposal, IDP

**Year 4** Research, Thesis Committee Meeting, IDP

**Year 5** Research, Ethics/RCR, Internship, Thesis Committee Meeting, IDP

**Year 6+** Research, Thesis Committee Meetings, IDP

Seminars, involvement in student groups, service and volunteering, and other events continue every year. The Research Defense and Public Defense take place in the final year.

The mean time to PhD in our program is currently 5.9 years, and the median is 5.7 years.

The Academic Training Environment at JHU

Johns Hopkins University broadly, and Biomedical Engineering specifically, is a great community to be a trainee – whether at the undergraduate, graduate, postdoctoral, or other levels. The faculty, staff, and other trainees are supportive and collaborative. While our trainees achieve at the highest levels in their research and classes, the atmosphere is not competitive but open.

Mentoring During the BME PhD Program

Along with regular meetings with your research mentor, you are expected to have meetings with other faculty members throughout your time in the program. This includes the DBO (an oral exam) and Thesis Committee meetings – more on these later. The Program Director and Program Manager are also available to talk with you.

**Progress Report**

The primary mechanism with which the Program Director can follow your progress in the program is via the online Progress Report form. As you enroll in courses, embark on laboratory rotations, take your Doctoral Board Exam, hold a thesis committee, write a manuscript, give a talk, etc., you should update this form. Check and update the form at least every three months. The form should be an accurate record of all your academic activities during your PhD years. The data in this form is kept confidential, and is available to only you, the Program Director, and the Program Manager. The data are used to monitor your progress in the program.

We also regularly celebrate student achievements at our monthly student-faculty mixers, during which the program director gives kudos to students for achievements, whether academic, research, or personal.
Academic Probation occurs upon: receiving grades below B- in any course (or failing to pass a Medical School course), or not meeting program milestones in a timely manner. Issues of academic probation are addressed by the Program Director in collaboration with the student and, if necessary, the research mentor.

Individual Development Plan
As part of the university’s commitment to good mentoring, JHU policy requires that PhD students meet their faculty advisors annually to discuss the student’s Individual Development Plan (IDP). Once you’ve committed to a research lab, you must have an annual formal meeting each year with your research mentor during which you discuss your IDP. An IDP is a tool that facilitates discussion between you and your mentor regarding the status of your project, effectiveness of mentoring, organization of the lab environment, and your long-term career goals. The student completes the form first on their own, then the faculty member reviews and comments on it, and then the student and faculty member have a meeting to review and discuss the completed form, and to discuss any key issues arising from it. You can read more about IDPs in the Professional & Career Development section later in this document.

Diversity and Inclusion
Johns Hopkins, and Biomedical Engineering, prides itself on building, maintaining, and supporting an inclusive environment for everyone – students, faculty, and staff. Our community is one that communicates, collaborates, and supports each other. This is important because diversity is a key component of excellence in science. Diverse voices bring new approaches and ideas, and increase creativity – a key driver of scientific discovery.

We encourage students from many different backgrounds to apply to our program, and our student body is more diverse than is typical in engineering programs. Of the students who matriculated in the last five years, 45% (90 of 200) are female, and in both 2019 and 2020, female students comprised more than half of the incoming class. Of the US students who matriculated in the last five years, 22% (28 of 130) identify as belonging to racial or ethnic groups typically underrepresented in science and engineering. In a 2019 student survey 26% of responding BME students identified as LGTBQIA+. In the same survey, 27% of students said they have a disability or chronic condition – including learning disabilities, sensory impairments, and other long-term physical or mental issues.

All of our students are exceptionally successful, so the message is clear: don’t let anyone tell you that you can’t succeed here or that you don’t belong here – you can, and you do.

We aim to provide the support each of our students needs to succeed and to be a full part of the BME and JHU communities. For example, we work with Student Disability Services staff at Homewood and the School of Medicine to make accommodations designed and requested by students. We also encourage you to get involved with student groups that foster inclusion and that provide a home and a voice for students, including the JHU BME Equity, Diversity & Inclusion Committee (EDI, twitter), and the following school-wide groups:

- The Biomedical Scholars Association (BSA) (email, twitter) supports graduate students from underrepresented minority backgrounds.
- The Gertrude Stein Society (GSS) (email, twitter) supports lesbian, gay, bisexual, transgender, queer, and allied members.
- Women of Whiting (WOW) (twitter) and The Graduate Women's Empowerment Network (GWEN) support women in STEM across JHU.
- Native Circle (email) supports Native American graduate students, staff, faculty and community members.
- The Society for the Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS) (email) supports Chicanos/Hispanics and Native Americans in STEM, from college students to professionals.

There are likely even more clubs and groups that may interest you; if not, start one!

The BME department faculty also has a Diversity, Culture, Inclusion, and Equity committee (DICE), led by department Vice Chair Professor Warren Grayson, and a representative of the BME PhD students have attends those meetings. For
more on D & I issues at Hopkins, follow the websites of the SOM Office for Diversity & Inclusion, the JHU Diversity Leadership Council, and the Office of Institutional Equity.

This inclusive, communicative environment extends to how people interact intellectually and scientifically too. At Johns Hopkins, and in Biomedical Engineering, you will find: open doors to potential collaborators and expert advice; collaborative interdisciplinary projects; a culture of sharing equipment, resources, and ideas; and supportive faculty, staff, & peers who help you succeed.

Mental Health
If you are having difficulty, ask to talk to your mentor or ask to talk to the program director – any time. The graduate students of BME EDI have put together an excellent guide to mental health resources at JHU. Student Assistance Program (SOM/SPH/SON):
http://www.hopkinsmedicine.org/uhs/SAP
Counseling Center (KSAS/WSE): http://www.jhu.edu/~ccenter/

Reporting mistreatment
Building a community means treating each other with respect. When people do not live up to this, it’s important to call it out. Bullying, harassment, racism, and other unacceptable behaviors should be reported, whether it comes from faculty members, students, or staff; and whether you or someone else is the victim of this behavior.

You have multiple possible people/institutions you can report to:

- Program Co-Directors (Patrick Kanold and Rachel Karchin, BMEPhDCoDirectors@lists.johnshopkins.edu)
- Department Director (Michael Miller, mim@jhu.edu)
- Associate Dean for Graduate Biomedical Education (Peter Espenshade, peter.espenshade@jhmi.edu) Office of Institutional Equity (OIE, https://oie.jhu.edu/),
  including https://oie.jhu.edu/discrimination-and-harassment/
  and https://oie.jhu.edu/sexual-misconduct/index.html
- SOM mistreatment reporting (http://mistreatment-reporting.med.jhmi.edu/)

Admission to the PhD program
Admission is by application through the School of Medicine, with a deadline of December 1\textsuperscript{st} each year. Applications are reviewed, through a holistic process, by faculty and offers are made to join our program. Prospective students interested in our program are encouraged to reach out to program faculty in whose research they are interested, and to contact the student-created and student-run Application Assistance Program (BMEAAP).

There are two types of offers we make – rotation offers and direct-match offers – and the difference between them is only the process of choosing a thesis research lab before or during first year. In all other respects, the program is the same for all students. One type of offer isn’t better than the other – based on our experience, some students prefer the certainty of the direct-match offer, and some students prefer the flexibility of the rotation offer.
Rotation offers
We have a limited number of places on NIH-funded training grants that enable students to rotate through different laboratories in their first year. We will discuss these rotations more in the next section; students are able to rotate with any BME faculty and JHU faculty outside BME who are accepting students. Typically, students do 1-3 rotations before settling on their thesis lab by the end of their first year (i.e. by the first anniversary of their matriculation).

Direct-match offers
We also make offers to join our PhD program and to join specific research labs from day one of the program. These offers are often sponsored by at least two labs and offer the student a choice of a small number of labs in which to potentially rotate and give the student a larger exposure to the BME community.

Whether joining a lab directly from day one as a direct-match student, or choosing a lab following research rotations as a rotation student, all other opportunities and requirements of the program are the same.

Stipend and health insurance
The 2022-2023 stipend to PhD students is $35,608; the stipend is set by the School of Medicine, and typically increases 2% per year each July 1. Individual health, dental, and vision insurance (current year ~$5500) is covered by the program or by the research faculty mentor. BME PhD students pay no tuition to the school. Details on the health insurance benefits are maintained and updated by the School of Medicine – see this link for more, and some additional information here; partners and children can be covered but at additional cost to the student. Please direct all benefits questions (including those related to health and dental) to sombenefits@jhmi.edu.

International students
Approximately a third of our students are from overseas (one of the current Program Co-Directors was such a student himself many years ago!). We can provide letters supporting international students for visas and other important pre-immigration and post-immigration purposes. While we cannot provide specific advice on immigration, JHU has an excellent Office of International Services (OIS) that can provide both general and specific guidance, and that handles all visa and immigration needs. Be sure to be in contact with OIS early and often when planning to come to JHU.

MD/PhD students
Students interested in the combined MD-PhD program do not apply directly to the BME PhD program, but rather to the MSTP (Medical Scientist Training Program) administered by the School of Medicine. Information about applying can be found at the Johns Hopkins Medical Scientist Training Program/MD-PhD Program website.

Applications submitted for consideration of the combined degree will be reviewed by the MD-PhD Program Admissions Committee. Each and every application is given a holistic review by the MD-PhD Program Admissions Committee. Any MD-PhD application with an interest in the BME graduate program that is selected for an interview is sent to the BME PhD Program for review to make sure the candidate is competitive for the BME graduate program, and typically one of the interested student’s interviews for the MD-PhD program will be with a faculty member in the Department of Biomedical Engineering, specifically one who shares the applicant’s research interest.

After receiving an offer to the MSTP program, MD-PhD students can reach out to the Program Director to discuss the BME PhD program; in addition, after matriculation, students should reach out to talk about the requirements of the program. There are two key considerations of requirements that might be relevant for MD-PhD students: (1) the PhD program’s teaching requirement is waived as being satisfied by teaching opportunities during the MD years; (2) the Medical School curriculum far exceeds 18 credits of life sciences courses, therefore to complete the course requirements of the PhD program, the student need only satisfy the 12 required credits of engineering and quantitative sciences.

During their PhD years (typically years 3-6 of the combined program), MD-PhD students take full part in all aspects of the BME PhD program and are more than welcome to take part during their MD years as well (though we recognize that those years are busy!).
Useful links during the Coronavirus pandemic

The university maintains websites with the most up-to-date information on operations during the pandemic. At the moment (August 2022), the University is in Phase 3 of its reopening plan.

Coronavirus Information.

Covid Vaccination and Booster Information.

Information for Graduate Students.

Return to Research.

COVID dashboard.

Testing requirements and availability are subject to change and are campus dependent. Please refer to the Diagnostic Testing page for the latest information:

- Voluntary asymptomatic testing on demand is available at several locations. Graduate students at either campus may obtain an appointment for a free asymptomatic test via MyChart at any time.
- At the School of Medicine, affiliates must follow Johns Hopkins Medicine Testing Policies.

Reporting for Coronavirus concerns

Adherence to COVID-19 workplace safety guidelines needs to be enforced at all times. Noncompliance with current guidelines will result in suspended campus access depending on the severity and frequency of the infraction.

Report abuse/problems/concerns to the PI/lab captain or through university provided channels:

- closecalls@jhu.edu for simpler, non-incident, issues;
- Department of Health, Safety and Environment (410-516-8798) for lab safety reporting;
- Security (410-516-7777) or 911 for emergencies.
YOUR RESEARCH AT JHU

Without doubt, one of the main reasons students come to Hopkins for their PhD is the outstanding array and depth of research opportunities. There are many ways to become acquainted with these opportunities – you should check out the websites of research groups, read some of their published work, and above all reach out and talk to potential mentors in whom you are interested.

BME PhD students are not restricted to labs of BME faculty members; our students can conduct research in almost any lab at JHU. As of March 2021, the 251 current PhD students have 76 different faculty mentors. The primary mentor must be a tenure-track faculty member (Assistant, Associate, or Full Professor). Other faculty may be part of a thesis committee, or act as a secondary advisor if approved by the Program Director.

Many of the laboratories at JHU are also organized into research communities, including interdisciplinary centers and institutes; here are a sampling of such communities with significant BME involvement:

- **APL** Applied Physics Laboratory
- **CBID** Center for Bioeng. Innovation & Design
- **CCB** Center for Computational Biology
- **CHB** Center for Hearing and Balance
- **IBBS** Institute for Basic Biomedical Science
- **IGM** Institute for Genetic Medicine
- **MBI** Mind-Brain Institute
- **KNDI** Kavli Neuroscience Discovery Institute
- **CCSI** Carnegie Center for Surgical Innovation
- **CCD** Center for Cell Dynamics
- **CIF** Center for Epigenetics
- **CIS** Center for Imaging Science
- **ICM** Institute for Computational Medicine
- **MINDS** Mathematical Institute for Data Science
- **ICE** Institute for Cell Engineering
- **TTEC** Translational Tissue Engineering Center

Some students receive admission offers that enable them to rotate among any labs that interest them during first year. These rotation opportunities are supported by NIH-funded training grants. In addition, some students receive offers that directly match them to specific labs starting from day one.

**Research Rotations (if applicable)**
The aim of lab rotations is to identify a suitable mentor and lab for your thesis research. It also enables students to learn new techniques and approaches. Before matriculation, the students should contact faculty to set up their first rotation. Typically, the first rotation begins when the student matriculates; most commonly in mid-August, but students can choose to come earlier in the summer to start their rotation (specific available start dates are set out in the offer letters). In addition, for students taking Anatomy, which is the first course in the medical school curriculum, rotations can begin in the first available block of time after completion of that course (all the Medical School courses are time-intensive and it is generally difficult to accomplish a lot in a lab rotation during those courses; fortunately they are also shorter overall than more traditional courses).

Students doing rotations must complete at least one rotation during their first year; rotation length depends on the wishes of both the student and mentor, and we suggest at least a minimum of 8 weeks. Students are not required to continue on to additional rotations if they have identified their thesis lab, nor is there a set number of rotations (we recommend 2 or 3 so that the experience is sufficiently informative for you).
Students declare a thesis lab within the first year from the date of their matriculation. On rare occasions, despite reasonable efforts by the student, a match might not be found by the end of their first 12 months in the program. In that case, the student will meet with the Program Director to select their next rotation.

**To start each rotation**, the student submits the Rotation Agreement to the BME PHD office (BMEPhDTeam@lists.johnshopkins.edu). This form is signed by the proposed mentor.

**At the end of each rotation**, the student submits a one-page description of the work accomplished during the rotation to the BME PHD office (BMEPhDTeam@lists.johnshopkins.edu), with the faculty mentor cc’d.

**How to pick a mentor**
Rotation students can choose to work with almost any tenure-track faculty member at JHU. The faculty at JHU are great scientists, engineers and clinicians doing pioneering work on tough medical problems. How do you choose a good lab for you? Note: Research Professors in WSE cannot be Primary advisors but can be Co-Advisors with a tenure-track faculty member.

**Topic.** What are your interests – e.g. a specific disease, or a specific approach? Working on a problem or methodology that interests you will help you succeed.

**Mentor style fit.** Do you prefer lots of contact, lots of independence, a mix of both? Do you like to work in teams or have a solo project? When you have a conversation with the mentor, do the ideas start flowing? In group meetings, do they encourage discussion and let the trainees talk? Do they set a good example for vigorous and inclusive discussion? Remember that you will have a long relationship with your mentor (within and beyond grad school) – do you think they are someone that will give you guidance and advice on what’s best for you?

**Lab Culture.** How are the relationships among the other students and the PI? Are these colleagues you want to see regularly? Will they give you good feedback, interesting suggestions, and challenge your thinking?

**Commitment to good mentoring during your PhD**
Mentoring is one of the most important components of your research experience. It’s not just about good guidance in research – your PI and thesis committee members should keep your best interests in mind (whether regarding research, professional development and career planning) on a regular basis. They should ask you about your goals and priorities, and what they can do to help you achieve them. JHU & BME are committed to quality mentoring. We will distribute the [JHU Mentorship Commitments of Faculty Advisors and PhD Students](mailto:BMEPhDTeam@lists.johnshopkins.edu) to students & faculty annually. Do read it – there are responsibilities listed for both faculty and students.

**Attending BME Seminars**
The BME department hosts a weekly seminar series during the semesters. During your first year, attendance at BME seminars and registering for the accompanying BME Seminar class (EN.580.781) is required and provides a great way to survey different areas of research, as well as build an appreciation for the breadth and interdisciplinarity of Biomedical Engineering as a field. If the seminar series conflicts with other classes, you can take this requirement in second year or watch recording seminars. There are also many other excellent seminar series hosted by other departments, centers, and institutes at JHU that you can take advantage of.

**Milestones through the program**
Through the program, there are several key check-in points:

- The DBO – the Doctor of Philosophy Board Oral exam
- Thesis Committee Meetings, especially:
  - Thesis Proposal
  - Research Defense
  - Public Defense

We’ll discuss each of these in turn.
**The DBO – the Doctor of Philosophy Board Oral exam**

Our program does not have a written qualifier exam, but instead has an oral exam administered by five faculty. These five faculty are specific for each student and most commonly are selected from among faculty instructors of courses that the student has taken. The DBO is a university requirement, and it is expected that BME PhD students take the exam once classes have been completed, and no later than the end of the second year. Many students complete their course work in Year 1 and schedule their DBO for the summer or winter following Year 1. Students who do not pass the DBO on their first or second try cannot continue in the PhD program. More detail on the DBO can be found in Appendix A of this document.

**The Coating Ceremony**

Johns Hopkins School of Medicine hosts a ceremony that celebrates graduate students embarking on thesis research. The Coating Ceremony typically takes place in the fall, and students will take part after they pass the Doctoral Board Oral (DBO) exam. Students receive an embroidered white lab coat – presented by their program directors – and jointly recite the Graduate Student oath. Here’s a video that follows Amanda Edwards, a BME PhD student who took part in the ceremony in 2015.

**Thesis Committee**

The Thesis Committee is specific to each student and selected by the student. The committee assists the student, providing critical review of progress, methods, and plans. The committee provides written feedback on the student’s progress and research plan, and in addition will discuss career development and professional development with the student. Assessment by faculty independent of the thesis supervisor is crucial. The thesis committee should be formed and meet for the first time in the 1st year after the DBO. Note, that can be before your thesis proposal. You will meet with your thesis committee annually*, starting no later than twelve months after your DBO. One of the first meetings will be your Thesis Proposal (typically Year 3), and the last meetings will be your Research Defense and Public Defense. At each meeting, the student gives an oral presentation of their scientific progress.

* After 6 years in the program, the student’s committee must meet twice per year to ensure progress of the student towards graduation and help address issues that may be affecting the student’s ability to complete their thesis.

**Process for Annual Thesis Committee Meetings.**

1. The Program Administration (BMEPhDTeam) must be informed about the composition (formation and changes) of the thesis committee.
2. The Program Administration (BMEPhDTeam) must be informed in advance of the date and time of each Committee meeting, along with a working title for the student’s presentation.
3. At least one week before each meeting, the student must provide each member with a written statement, typically 2-3 pages in length, summarizing (a) the student’s progress during the preceding year and (b) plans for the following year. Each member of the committee must also receive a copy of the previous committee report.
4. Typically, the meeting begins with the student asked to step out of the room so that the mentor can give the committee members thoughts on student progress.
5. The student gives a research update by oral presentation, with slides, including plans for the upcoming year and any career development or professional development plans. The committee discusses progress and plans with the student.
6. The student is asked to step out again so that the committee can discuss their recommendations with the mentor and complete the committee report (see step 8). The report should summarize the student’s progress and the recommendations of the committee.
7. The student returns and the committee chair explains the recommendations to the student.
8. Finally, the mentor departs and the student has an opportunity to discuss any issues with the other committee members.
9. The chair of the committee will send the thesis committee report form to the program administration.
10. Following each meeting, including the thesis proposal and research defense meetings, the chair of the Thesis Committee submits a report to Program Administrator. Copies of the report are distributed to committee members and to the student, and the report is placed in the student’s file.

Annual Thesis committee meetings starting in the first year post-DBO are a graduation requirement and are also a mentorship requirement for participation in the BME program. Failure to provide the student with annual thesis committee meetings can result in participation restrictions in the BME program (e.g. inability to recruit students) being placed on the mentor.

**Thesis Committee Composition**

The Committee consists of at least three faculty members (including the research mentor) but can have more if the student wishes. We highly recommend that the committee be made up of greater than three members in case unforeseen circumstances arise (e.g. at the defense) to ensure that at least three members are present. The faculty members are selected and invited to serve by the student, in consultation with their mentor. At least one committee member must have a primary appointment in the BME Department. Other members can come from the JHU community or be from outside from JHU. Members have to hold faculty positions or equivalent. The advisor is responsible for vetting the qualifications of the members, but members are chosen based on request by the student. Members are expected to advise and support the student throughout their thesis research, but the student may also change the composition of the committee over time. As such members are expected to be experts in the area(s) of the student’s research. If there are questions, the program directors can be consulted as to the appropriateness of a proposed member.

If the student is on academic probation the composition of the committee should not be changed until the end of the probationary period. This is to ensure the integrity of the probationary process.

The most senior of the non-mentor members serves as “chair” and is responsible for completing the thesis committee report form. Tele-conferencing is permitted if necessary.

If there is disagreement between the student and the mentor about the composition of the thesis committee, the program directors should be notified and will mediate to attempt to reach agreement. In such a case, the final decision lies with the program directors.

**Thesis Proposal Document & Presentation**

This will be one of the first Thesis Committee meetings. The Thesis Proposal meeting should take place by the end of Year 3. Early Thesis Proposal timing is beneficial to get feedback for submission of NRSA and other fellowship applications, and for earlier focusing of research.

Two weeks before the Thesis Proposal oral presentation, the student must provide a written Thesis Proposal document to all members of their committee. Details on the format of this written document are given in Appendix B of this document. This proposal should be developed in collaboration with the thesis advisor, but is written by the trainee. Be clear, be succinct. Well-written thesis proposals have sufficient detail to allow a faculty member other than your mentor to review the proposal without having specialized knowledge or needing to refer to previous publications. The members of your Thesis Committee will provide written feedback to the student about the written Thesis Proposal.

The oral presentation portion of the Thesis Proposal is open to the Hopkins community, and lab members and other students are encouraged to attend. The presentation is followed by a closed-door discussion between the student and their committee; at least three of the committee members must be in attendance. The oral presentation by the student is typically 30 minutes, followed by a brief period of questions from the public, followed by closed-door committee questions and discussion. The committee discusses the proposal with the student and can accept or reject it.

**Research Defense (aka the ‘Permission-To-Write’ meeting).**

This is a closed meeting between the student and their Thesis Committee. The purpose is to determine whether the
student has conducted research that is appropriate and sufficient to provide the basis for a dissertation. The student may have generated a draft thesis; most students will already have manuscripts accepted for publication that will form part of the thesis. In addition to their oral presentation, students should be prepared for detailed technical questions on their methodologies, data, and conclusions, as well as contextual questions on the innovation and impact of their work.

If all members are satisfied, the Committee will give the student permission to write their Dissertation. This will be indicated on the Thesis Committee Meeting form. If permission is not given, then the committee will give the student specific written guidance on the problems to be addressed and work needed to ensure a successful subsequent Research Defense meeting. These could include additional experiments, analysis, review, or writing.

**Timing.** The Research Defense meeting must be scheduled a minimum of one month before submission of the written Dissertation. For graduation in May of the same calendar year, this will be approximately the third week of February (check with the program administrator, dates are set by the Registrar’s office each year). In addition, following the Research Defense, the Public Defense and Dissertation will be completed within 6 months.

The **Public Dissertation Defense**

This is the student’s final oral presentation of the PhD program. It is an open and public meeting, and often students will invite their family members, friends, and the broader JHU BME community to join. Because of the audience, it is common for the oral presentation to be more broadly accessible than that for the Research Defense, but the student is still expected to present a both a summary of all their work and a more detailed description of a portion of their work (it is understood that everything the student has done during the PhD program could not possibly fit into a 45-minute presentation!)

The Thesis Committee uses the presentation, along with the written dissertation, to make the final determination as to whether the work completed, and the written dissertation are appropriate for submission to the Graduate Board. If the Dissertation is not approved at this meeting, specific written instructions will be given on the points that must be addressed to render it acceptable. The Dissertation Defense must be attended and approved by all members of the Thesis Committee. For the written dissertation, only two of the committee (typically the Thesis Advisor and one other member of the student’s choice) are designated as Readers; they give particularly detailed feedback and will sign a letter to the Graduate Board attesting to the significance of the dissertation work.

**Timing.** The Dissertation Defense meeting must be scheduled at least one week before submission of the Approved Dissertation and Related Forms. For graduation in May of the same calendar year, the latest date for the submission of Approved Dissertation and Related Forms is approximately March 22nd (check with the program administrator, those dates are set by the Registrar’s office each year; there can be no exceptions to the Registrar’s office timeline). In addition, there is a maximum period of 6 months between the successful Research Defense and the approval of the thesis by a successful Dissertation Defense. If the Dissertation has not been approved by the Thesis Committee within this time frame then the student will be placed on leave of absence without pay. A waiver to this deadline requires the approval of both the student’s thesis advisor and the chair of the Thesis Committee.

The **Dissertation (aka ‘The Thesis’).**

The Dissertation should be prepared in consultation with the thesis advisor. It is usually divided into chapters, and should begin with a general Introduction, which summarizes the history of the general area and the problem. A general Methods section can be used to describe those methods that are common to multiple chapters. Following the chapters which present and discuss the various experimental results (these often align with published papers or in-preparation manuscripts), there should be a general Discussion which addressed the implications and limitations of these findings, sets them within the context of related work in the literature and points to some future directions.

The Dissertation must be submitted to the Thesis Advisory Committee in complete form with all figures embedded. It should represent what the student believes to be a complete and final document. The Dissertation must be submitted to the Thesis Advisory Committee at least two weeks before The Dissertation Defense and three weeks before the Submission of the Approved Dissertation and Related Forms. There can be no exceptions to that timeline.
**Note on graduation/commencement timing.** The university confers degrees three times per year (Spring, Summer, Winter), but the School of Medicine Commencement is only held in May. In order to ‘walk’ and be ‘hooded’ in May, there are deadlines as noted above. However, the student can complete their requirements for graduation at any time, and once the requirements have been met the Registrar’s office can issue a letter attesting to this fact. That letter is sufficient to allow students to begin postdoctoral fellowships, employment, residencies, etc.

**MD/PhD students returning to the clinic** must schedule a research defense at least 3 months prior to returning to the clinic and must complete all degree requirements including submission of the approved dissertation to the Graduate Board and the Dissertation Defense prior to returning to the clinic.

**Food Policy for Meetings**
As you can see, there are several times during a student's time in the program when they convene a group of faculty: DBO, Thesis Proposal, Thesis Committee meetings, Research Defense, and Public Defense.

There is no expectation that the student is required to provide coffee, snacks, or other food/drinks for these meetings. It would be both a time and financial burden to the student as they prepare for the meeting.

If a student's faculty advisor so desires, they may choose to provide coffee, snacks, or other food/drinks at these meetings, provided that (a) it is paid for by the faculty advisor (e.g. discretionary lab funds) and not by the student; and (b) the student whose meeting it is not required to arrange or fetch it.
Along with research, JHU offers outstanding academic courses taught by world leaders in their fields. The goal is for students to take coursework that benefits their training and their doctoral research.

**Course Requirements**

BME PhD students at JHU take at least 30 credits* of relevant course work. Relevant courses are those that are categorized as either life sciences/medicine or engineering/quantitative science. At least 12 of these credit hours are to be taken in the life sciences or medicine, and at least 12 of these credit hours are to be taken in engineering or quantitative science subjects. There is no core technical course that all students must take because we believe strongly that the student experience is broad and that different courses benefit different students. We try, as much as possible, to be flexible so that students take the courses that are the most appropriate and beneficial to them and their training. All 1st year students are required to attend the BME seminar, take a 2 credit course “Ethical Challenges in BME” (EN:580.710) offered in the fall semester, and take a course in responsible conduct of research (ME:800.811 or AS:360.625) also offered in the fall semester. Note that the ethics course requirements are separate from the 30 credits of relevant course work. Ethics courses do not count toward this 30 credit requirement.

**Why we require courses:** One goal of this training program is to help you become trilingual; fluent in biology, medicine, and engineering. Solving medical problems needs interdisciplinary approaches. Taking courses across these different disciplines will give you the ability to collaborate with and lead multidisciplinary teams.

**Transfer of credit.** For those who have taken equivalent graduate-level classes at JHU and possibly elsewhere (e.g. during the JHU master’s program), we may under special circumstances permit transfer of a limited amount of credits on a case-by-case basis; send requests to the Program Director. A maximum of 6 credits can be transferred from an outside institution and a maximum of 8 credits can be transferred from a JHU master’s program. Only classes at the 600-level or above (or equivalent) can be transferred.

**Course Requirements in Life Sciences and Medicine.**

Students take at least 12 credits of graduate course work in the life sciences. Many of our students take a subset of the first year Medical School curriculum to satisfy this requirement. Seats in Medical School courses are limited (particularly Anatomy), but every year some of our students take Anatomy, Immunology, and other Med School courses taught by international experts at a top-three Med School alongside the medical students. These courses are on a very different schedule to typical engineering courses, meeting every day, often all day, for short sessions; this means that some of them carry high credit values in a short span of time*. As of 2022 SOM has switched to assigning credits to each course and these might differ from what has been used in the past. Please make sure to use current information in your course planning. Here, for example, are the courses and approximate course dates:
**Human Anatomy** Aug–Oct

**Scientific Foundations of Medicine (SFM)**
  - Block 1 (Cell Phys)
  - Block 2 (Genetics)
  - Block 3 (Metabolism)
- SFM-Pharmacology Nov/Dec
- SFM-Histo/Path Nov/Dec

**Genes to Society (GTS)**
- GTS-Immunology Jan
- GTS-Microbio/Infectious Disease Jan – Feb
- GTS-Neuro & Special Senses (NSS) Apr – May
  - Block 1 (Neuroanatomy) Apr
  - Block 2 (GSM) Apr– May
  - Block 3 (SSM) May
- GTS-Neuro Brain/Mind/Behavior (BMB) Apr– May

Immunology is the most popular of these classes among those interested in molecular, cellular, and tissue engineering (and Immunoengineering, obviously), whether they are experimentally or computationally oriented. Anatomy is also popular, in particular for students interested in biomedical imaging (it includes human cadaver dissection and different imaging modalities). Pharmacology, macromolecules, metabolism, and genetics are popular, and some Neuroengineering students take some or all of the Neuro and BMB classes (though many prefer to take the Neurocognition I & II classes offered by the Neuroscience department).

Med School courses do not use letter grades; a passing grade is ‘P’ (>=70%). To pass Med School courses, each exam within a course must be passed (can’t just pass a class ‘on average’). Some medical school courses offer a chance to remediate a failed exam. Failing remediation can mean repeating the whole course the following year. The remediation procedure includes support from a Learning Specialist, and we encourage you to take advantage of the available resources if needed. The procedure is detailed here: https://hpo.johnshopkins.edu/som/policies/886/39181/policy_39181.pdf

We will have an information session in June about the requirements and challenges of the Med School courses. If you are interested in these please attend to learn about what it takes to succeed in these courses. Moreover, because of the limited availability of slots in Anatomy, students will be chosen based on their academic background, research interest and a lottery.

While Medical School classes are popular, the life sciences/medicine requirement may also be met by taking other classes in the Schools of Medicine (see the [graduate course catalog](https://bemedical.jhu.edu/graduate-department/courses)), Public Health*, Arts and Sciences, and Engineering (see the [course catalog for non-Medicine schools](https://www.jhu.edu/courses)), including quantitative biology courses. JHU is the leading life sciences discovery institution in the world, and the educational options are enormous. We simply can’t list all the options here, but we encourage you to explore them at the links above.

*The Bloomberg School of Public Health uses a quarter system and a credit system that is double that of the Schools of Medicine and Engineering; therefore 4 credits at BSPH is equivalent to 2 credits for BME purposes.*
Course Requirements in Engineering and the Quantitative Sciences

Students take at least 12 credits of coursework in math, applied math, engineering, computer science, and/or quantitative biology. These courses must be at the 400 level or higher, with at least 6 credits at the 600/700 level. Of these 6 credits, at least 3 must come from courses with substantial theory content in engineering, mathematics, or computer science. The full course catalog is here: https://sis.jhu.edu/classes/

Here’s just a selection of relevant electives offered by BME faculty members; there are many more, and there are many relevant courses taught outside our department. Please see this website for more information: https://www.bme.jhu.edu/academics/graduate/phd-program/phd-courses/

Note: seminar courses typically do not satisfy requirements.

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<th>Build Your Own Prosthesis</th>
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<td>Design Surgery for Engineers</td>
<td>Foundations of Computational Biology &amp; Bioinformatics</td>
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<td>Imaging Instrumentation</td>
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<td>Neuro-Image Processing</td>
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<td>Precision Care Medicine</td>
<td>Computational Stem Cell Biology</td>
<td>Mathematics of Deep Learning</td>
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For a course to apply toward graduation, a grade of B- or higher is required. If a grade lower than B- is received, then that course must be repeated. If it is not possible to repeat the course, then an alternate course may be taken but must be approved by the Program Director.

Faculty mentors may advise that students choose specific electives of particular importance to each of the research and training areas. Ultimately, it is the student’s decision what courses to take.

Key questions on course requirements

Is there a complete list of courses satisfying the biology or engineering requirements? In brief, no. We have tried to do this in the past, but in truth keeping up with new classes every year means that any list of what counts quickly becomes out of date and unnecessarily discourages students from taking new and interesting classes. In addition, the definitions in each category are very broad and encompass a lot of classes. If the class obviously falls into one of the above categories, it counts; if in doubt, check here and if questions remain ask Joe Greenstein (jgreenst@jhu.edu) or the BMEPhDTeam. Note that there are many quantitative biology classes – a particular strength at JHU – that you can count for either the engineering or life sciences categories.

Can I take classes anywhere at JHU? In general, yes, though there are a few exceptions that carry an extra charge, including the Krieger School of Arts & Sciences AAP classes, and Peabody Conservatory music classes. Please check! Any classes offered by the Whiting School of Engineering, the School of Medicine, or the Bloomberg School of Public Health during the Fall and Spring semesters should be available to you at no cost.

What counts for the 'substantial theory' class requirement? As noted above, at least three credits should be in engineering, mathematics, or computer science classes that have a substantial theory component. As a guide, any class with a significant amount of coding or math counts for this, including biostatistics classes, mathematical or computational modeling classes, computational genomics classes, data science classes, and many more including classes in dynamical systems, numerical methods, mathematical foundations of imaging, transport phenomena, signal processing. Most students satisfy this requirement many times over. If in doubt, look here and if questions remain ask Joe Greenstein (jgreenst@jhu.edu) or the BMEPhDTeam.

Can I transfer credit from other institutions or from a JHU MSc program? We want you as a JHU Ph.D. student to take classes at JHU and benefit from all we have to offer. However, under special circumstances we may allow transfer of a course on a case-by-case basis. In general, this would have to be graduate-level course that would satisfy our course requirements if you took them as a PhD student here. If you were a JHU MSc student and have already taken some
graduate level classes that would count towards the Ph.D. requirement that is usually straightforward. Students who took graduate courses as a graduate student at other institutions can also request the program director to review a limited number of courses in exceptional circumstances for transferability of credits; send a transcript and course syllabi along with an equivalent JHU course to the program director for review. Transfers from other institutions are limited to a maximum of 6 credits and transfers from JHU are limited to a maximum of 8 credits. Only classes at the 600-level or above (or equivalent) can be transferred.

Registering for Classes

All BME PhD students are graduate students in the School of Medicine. This carries some advantages, including the potential for registering for Medical School classes. It also makes registration for classes outside of the School of Medicine (for example, in the Whiting School of Engineering or the School of Public Health) slightly more complex, because it involves ‘interdivisional registration’ (IDR). Following these guidelines will help you access the courses you need and want.

Registration dates. Graduate registration for the subsequent semester opens on a different date each semester; this date is typically in mid-April (for Fall courses) and in mid-November (for Spring courses). It is particularly important to check in advance for these dates for courses at Homewood, some of which tend to fill up shortly after registration opens. The dates are not always announced far in advance.

Please Note: Starting in Fall 2022 the School of Medicine will switch to self-service electronic registration via the university-wide Student Information System (SIS). Registration for course offered by the School of Medicine will be completed via SIS, while interdivisional registration will follow the process outline below.

Step 1. Identify courses that you are interested in. For all courses in the School of Medicine, Whiting School of Engineering, and the Bloomberg School of Public Health, use the SIS site to search the catalog, and note the names of instructors with whom you would like to take courses (as well as the course number and title). The courses available for the next semester are typically posted on SIS in the middle of the current semester, e.g., in March for Fall courses; but you can look at previous semesters to see what courses might likely occur again. Please note that most classes at JHU, especially most graduate-level classes, occur only once per year (i.e., either Fall or Spring), and usually in the same semester each year. Very few, if any, graduate-level classes take place in the summer.

Specifically for classes in the first-year Medical School curriculum, check with the Program Administrators because seats are limited to non-medical students, registration happens at irregular date due to courses running fractions of the semester, and the School of Medicine works directly with the program to facilitate registration of BME students. Typically, enrollment in these courses occurs 3-6 months before the start of the course.

An overview of the Medical School classes is provided here and more details on the first-year classes are available here.

Step 2. For classes outside the School of Medicine*, obtain instructor permission. This is an important part of the interdivisional registration (IDR) process. We have found that most instructors are very responsive; you send an email to them with the name of the course and noting that as a SOM PhD student, you need instructor permission to register for their course. They need only respond in the affirmative, and you can save and attach the email exchange to your registration request (Step 3). You can and should obtain this permission well in advance of the registration deadline. If you are having difficulty getting permission, let the program co-directors know, they can and do help make that happen. [*Note: The School of Public Health doesn’t seem to require instructor permission, but the Homewood registrar (Whiting School of Engineering & Krieger School of Arts and Sciences) definitely does. Additionally, director signature gives permission for all BME courses, so professor permission for these courses is not required.]

Step 3. Complete a registration request in SEAM. IDR registration requests are made via SEAM, the Office of Student
Enrollment and Account Management. The instructions for submitting an IDR request to SEAM are available [here](#) (refer to section for School of Medicine graduate students). You will need to fill out the SOM (electronically fillable) Change of Schedule Form. Currently, for Fall 2022, a signature is still required for IDRs. Send to kaybeard@jhu.edu for director signature. Once the completed form has been returned to you, “Request Support” on SEAM to open a student case and submit your form along with instructor approvals from Step 2.

When filling out the fields of the form, note that the format of course numbers is: **AB.ddd.ccc.ss**, where:

- **AB** = Division (e.g. EN = Engineering, ME = Medicine, PH = Public Health);
- **ddd** = Department (e.g. 580 = BME; 601 = Computer Science);
- **ccc** = Course Number (these three-digit numbers start with 1xx for first year undergrad, 4xx for senior undergrad, and 5xx, 6xx, and 7xx for graduate level classes);
- **ss** = Section Number (defaults to 01 if there are no sections).

The term and year of the course can be appended as well, so Systems Pharmacology and Personalized Medicine in Spring 2022 has a full course number of EN.580.440.01.SP22 (or EN.580.640.01.SP22 for graduate students).

Checking on courses for which you are registered. You can check on your course registration status in SIS.

Registering for Research. Regardless of the location of the student’s lab, as School of Medicine graduate students all BME PhD students must be registered for research year-round through the School of Medicine research course numbers. This gives all students full-time status, even when not taking other classes. This course is not letter-graded.

Required Training in Ethics and the Responsible Conduct of Research (RCR)
All PhD students are required to take training in Ethics and the Responsible Conduct of Research. Students must register for ME:800.811 (“Introduction to Responsible Conduct in Research”) in their first year. Homewood-based students may take AS:360.625 (“Responsible Conduct in Research”) as an alternative. This required RCR course is in addition to EN580.701 (“Ethical Challenges in BME”). These required ethics courses do not count toward the 30 credits required for graduation.

Also: We host Ethics and RCR discussions at the BME PhD student-faculty retreat each year.
Students are required to serve as a teaching assistant (TA) in one or more courses relevant to Biomedical Engineering, and ideally relevant to that student’s research or training. In most cases the requirement is satisfied by TAing for one semester-long course or two shorter duration courses (e.g., half-semester or intersession). A minimum of 3 credits in total is required to satisfy the requirement. Note that there are a few intensive half-semester engineering courses that carry 3 credits and TAing for one of these satisfies the requirement. TAing for a fraction of a course earns prorated credit (e.g., TAing for half of a semester of a 4-credit full-semester course counts as 2 credits toward the requirement). MD/PhD students are released of this requirement, as they have teaching expectations in their MD years.

**Why it’s required:** Learning how to teach is a hugely beneficial component of training, and not just for those students who might want to teach in the future: (1) you’ll understand the material better if you teach it; (2) you’ll better understand how people learn and how to communicate complex concepts to others of different backgrounds and levels of understanding.

**Timing.** The teaching requirement can be fulfilled at any time; it is most commonly completed in years 2 or 3 of the program. Simultaneously taking a course for credit and TAing that same course is not permitted.

**How to get a TA assignment.** Once each year, typically in the summer, the BME department will invite PhD students to request assignment to specific classes. It is not uncommon to request to TA a class taught by your research mentor, though this is not required. It is also not required to TA a class in the BME department; if you wish to TA a class in another department, you can contact that department or a specific instructor to investigate opportunities. Please make sure to let the program know, as we want to certify that the TAship is appropriate and satisfies the requirement. Occasionally, instructors outside BME contact the program with TA opportunities and we share those with students. The workload of TAing will depend on the class, but you should expect to not to spend on average more than 15h/week.

**TA training.** Late in the summer, the [Center for Teaching Excellence & Innovation (CTEI)](https://ctei.bme.columbia.edu) runs a TA-training course. While not currently required of BME PhD TAs, it is highly recommended. It will help you get the most out of your teaching experience, and the training will benefit your future students as well.

**Creating a new course.** Students may choose to create and teach a new course or teach a previously offered course during the University Intersession or during the summer. If the student chooses to do this in lieu of their TA-ship, it must be approved by the Program Directors, and the course materials and feedback are also reviewed after the course. Approval will require that the course syllabus be submitted to the Program Directors at least one month before the start of the Intersession, and the student may be asked to present a sample lecture. Depending on the enrollment of the intersession class, the teaching student can also be paid for this by the Whiting School of Engineering. This is in addition to the usual stipend that the student receives. Please note that co-teaching an Intersession course with another PhD student requires that the students share the TA credit, and it will be prorated evenly per student. For example, if two students co-teach a course, each student will satisfy half of their TA requirement after one course is completed, and the full requirement can be satisfied by offering the course a second time in the following year.

**Teaching Academy.** CTEI also offers a Teaching Academy through which you can use your teaching experience as part of a series of steps to earn a teaching certificate. Many of our students have taken advantage of this.
Individual Development Plan (IDPs)

Every year, students complete Individual Development Plans in collaboration with their research mentor. This includes having a detailed conversation about professional and career development with your mentor each year, using the written IDP document as a guide. This is a program requirement, and is also part of JHU policy related to good mentoring. IDPs can be updated more frequently, but must be revisited at least once each academic year (e.g. Sept 2021-Aug 2022 is an academic year).

There are multiple possible document formats that can be used for IDPs, including a JHU-developed one, a BME-developed one, and some labs have their own. Whichever document you use, you can customize it, focusing on or adding questions of particular relevance to you. The document itself plays a key role in initiating professional development conversations, but it is the conversations themselves that are the most important element. At each meeting of the student’s thesis committee, the committee will ask whether an IDP has been completed that year and whether there are key elements of it that need to be addressed.

Steps:

1. The student fills in the IDP document as best they can, and sends it to their research mentor.
2. The research mentor edits or adds comments and returns it to the student prior to the IDP meeting.
3. The student and mentor meet to discuss the IDP document, stepping through and spending time on any points that are particularly important to the student at this point in their career.
4. Following the meeting, the student completes the IDP feedback form online, including uploading a pdf copy of the completed IDP document.

If you are a rotating first-year student, you should still complete the IDP document and have an IDP discussion with each mentor. We encourage you to conduct the IDP discussion with all of your research rotation mentors, partly because this is an excellent discussion that would help you learn more about each lab and their mentorship style. If as a rotating student you prefer to conduct your IDP discussion with the program associate director (Dr. Joe Greenstein), then you are welcome to do so.

Annual IDPs are a graduation requirement and are also a mentorship requirement for participation in the BME program. Failure to provide the student with annual IDPs can result in participation restrictions in the BME program (e.g. inability to recruit students) being placed on the mentor.

Internships

The Johns Hopkins University School of Medicine and the Biomedical Engineering PhD program facilitate internships for Ph.D. students in fields outside academic research, such as Research and Development in biotech companies; technology transfer; science administration; science policy; science education; and scientific writing. Students may express interest in internship opportunities by completing the “Preliminary Interest in Student Internship” Form – which should be shared with the JHU internship program manager (e.g. BME EDGE or BCI – see below). If there is not a JHU program facilitating the particular internship, then this form should be submitted to the BME PhD Program Director.

Students are encouraged to discuss their career goals with their thesis mentor and graduate program director.
and ask them to complete the relevant sections of the form.

Students who express interest through the above form may submit an application for internship, either through a Johns Hopkins internship program, or directly to a host organization. Students who are offered and wish to accept an internship must submit a Memorandum of Understanding (MOU) signed by the mentor, the director of the BME PhD Program, and the Associate Dean of Graduate Biomedical Education, ensuring that all parties are in agreement. This document should specify which entity will be responsible for the student stipend and health insurance for the duration of the internship. In our experience, most external internships are paid by the hosting organization and the stipend is paused during this period.

A student who signs up for a full-time internship (2-6 months) may be placed on Leave of Absence (LOA) for the duration of the internship, or enroll in an Internship Practicum Course for credit. International students are not eligible for LOA and must instead enroll in the course.

**SOM Internship policies and documents**
The appropriate SOM policies and links to the Preliminary Interest and MOU forms are available at this link.

**Seminars – Biomedical Engineering and others**
As part of exploring the breadth of possibilities in BME, including academic research, industry, policy, and more, we encourage students to attend seminars when possible and to meet with speakers to talk about their careers. There are weekly BME seminars during the school year; there are also monthly Institute for Computational Medicine seminars; monthly Center for Imaging Science seminars; Translational Tissue Engineering Center seminars, and many more at both the Homewood and East Baltimore campuses. During first year, we require all first year students to attend at least half of the BME seminars; this is associated with course number EN.580.781, for which you will register at the beginning of the semester. You will submit a survey response for each seminar that you attend in order to receive a passing grade. Our intention is that students attend in person – it’s a better opportunity to ask questions and to interact with your colleagues. If, for a given semester, you have a class conflict, let Seminar Director (as of 2022, Dr. Doloff) know, and he can give you permission to watch the recorded versions of the seminars instead of attending in person, or delaying to second year is possible.

**Professional development organizations at JHU**

**BME-EDGE and BCI**
BME graduate students started EDGE (Extramural Development Graduate Education) in 2013 as an internship program and to provide information on non-academic careers. It continues to be a student-led and student-run organization. Dozens of BME PhD students have completed external internships since its founding, thanks to EDGE.

The School of Medicine also provides career resources and an organization that facilitates internships, the Biomedical Careers Initiative (BCI).

**PDCO**
The JHM Professional Development and Career Office (PDCO) is an excellent resource for students. Along with traditional professional development opportunities, workshops, seminars etc., they also host innovative programming, including longitudinal peer communities of interest for specific career tracks, known as OPTIONS.

**Phutures**
At the Provost level, in other words JHU-wide, a recent addition is the Phutures office, focused specifically on professional development at the PhD level.
FELLOWSHIPS AND AWARDS

There are a number of external fellowships that are available to graduate students; we encourage students to apply for these. The office of the Vice Provost for Research maintains a downloadable database of graduate student funding opportunities. They also maintain a searchable list of funding opportunities intended for underrepresented minority and/or low-income graduate students.

Below we describe some of the most popular opportunities, but you should take a look at the full lists.

In their first and second year, most graduate students who are US citizens or permanent residents are eligible to apply for an NSF fellowship (deadline is November annually), National defense science and engineering graduate fellowship (deadline in early December annually), and a DOE Computational Science Fellowship (deadline is January annually). US students (any year) may apply for an NRSA fellowship from the NIH (deadlines in April, August, and December annually).

Note: To be eligible for the NSF fellowship you need to be within the first 2 years from matriculation. Thus, students who matriculate early (e.g. July) are disqualified for application in their second year.

New immigrants to the United States are eligible to apply for the Soros Graduate Fellowship. Students doing research in communication sciences can apply for New Century Scholars Fellowship. Women and URM students working in computational and data sciences may apply for Computational and Data Science Fellowship (deadline in late April). Gilliam Scholars are funded and organized by HHMI. This is just a selection; there are many other fellowships available, including field-specific ones e.g. the American Heart Association.

Fellowship bonus policy

If a student wins a significant external, nationally competitive fellowship (worth more than $10,000), per School of Medicine policy they receive an additional one-time $3000 bonus, which by program policy is paid by the thesis mentor. The bonus can only be received once by a student, and the Siebel Scholarship (below) does not carry such a bonus. Students entering the program and rotating in their first year will have the bonus split proportionally among their rotation labs.

BME PhD Handbook, updated August 2022
**Siebel Scholars**
In the final year of the thesis research, all BME PhD students are eligible to apply for a Siebel fellowship. This program by the Siebel Foundation recognizes Biomedical Engineering graduate students who have demonstrated the highest levels of academic achievement and leadership. Johns Hopkins is one of 5 universities in the nation that have been selected for this program in the Biomedical Engineering category. It is a **$35,000** prize paid directly to the student, independent of the usual stipend that they receive. All JHU graduate students doing BME work (i.e. not just BME students) are eligible. **Applications** are due to the individual departments around May of each year. **Criteria:** nominee ranks within the top 10% of their Biomedical Engineering School class based on academic results; nominee demonstrates excellent leadership in the BME community or more broadly; nominee demonstrates a track record of distinguished research (published papers); nominee is expected to complete the doctoral degree between November of the nomination year and October of the following year (therefore, the application process starts 6-12 months before expected thesis completion).

**Young Investigators Day**
The School of Medicine awards about 12 graduate students and postdocs each year across all disciplines. Applications are typically due in January. [Here’s a video](#) with some students discussing Young Investigators Day.
There are numerous student-led and student-run organizations that greatly enhance the student experience, and contribute massively to the community of the BME department, Johns Hopkins University, and Baltimore. These include:

BME PhD Council: [https://bme.phd.council.students.jh.edu](https://bme.phd.council.students.jh.edu)
BME EDI: [https://bmeedi.wordpress.com](https://bmeedi.wordpress.com) (Equity, Diversity, & Inclusion Committee)
BME AAP: [https://jhubmeaap.wixsite.com/mainsite](https://jhubmeaap.wixsite.com/mainsite) (Application Assistance Program)
BME EDGE: [http://edge.bme.jhu.edu](http://edge.bme.jhu.edu) (Extramural Development in Graduate Education)

GSA (Graduate Student Association – School of Medicine): [http://gsa.jhmi.edu](http://gsa.jhmi.edu)
GRO (Graduate Representative Organization – Whiting School of Engineering): [https://studentaffairs.jhu.edu/gro/](https://studentaffairs.jhu.edu/gro/)
Women of Whiting: [https://wow.jhu.edu](https://wow.jhu.edu)
The Biomedical Scholars Association (BSA): email, twitter
The Gertrude Stein Society (GSS): [https://gssjohnshopkins.wordpress.com](https://gssjohnshopkins.wordpress.com)

...and many other clubs and groups.

Our program has a long tradition of fielding Intramural sports teams, and some students are members of bands, acapella groups, and many more activities. Many students take the opportunity to conduct STEM outreach via organizations such as the Baltimore Underground Science Space, or mentoring of at-risk students via organizations such as Thread, which was founded and is led by a graduate of our program, Sarah Hemminger.

Every month, the BME PhD Council hosts student-faculty mixers, at which student achievements are celebrated; and organizes student holiday parties. Every year in the fall, a student-faculty retreat takes place with a particular focus on welcoming the new first year students.
Parental Leave

Johns Hopkins University recognizes the importance of balancing the family and academic responsibilities faced by new parents and promoting the well-being of their families. The University is supportive of accommodating eligible full-time graduate students and full-time postdoctoral fellows, scholars and trainees (collectively “postdoctoral trainees”) who are expecting a new child. Consistent with grant funding policies that place a limit of 8 weeks for parental leave, all eligible full-time graduate students and postdoctoral trainees shall receive no less than 8 weeks of fully-paid new child accommodations. Each school has in place provisions for taking a formal leave of absence, which is an option at any time for students and trainees who are new parents. Electing this option relieves students of all university responsibilities but comes with consequences that may suspend students’ privileges and access to university benefits and resources. This option may also have visa consequences for international students. The goal of this Policy is to put in place a set of guidelines for full-time graduate students and postdoctoral trainees who have new family additions who do not elect a formal leave of absence.

For details of the policy, see https://www.jhu.edu/assets/uploads/2017/06/newchildaccomgradandpostdoc.pdf
Appendix A – “The DBO” (Doctor of Philosophy Board Oral Exam)

Requirement: Each student takes an oral exam administered by five faculty, some from within BME and some from other departments; more specific detail on committee composition below.

Why it’s required: This is one of three university requirements for the PhD (the others are dissertation & residence). The stated objectives are: (1) to assess a candidate’s proficiency in the discipline; (2) to give a student the benefit of a critical examination of his or her work by scholars outside the department or program; and (3) to provide a means for extra-departmental monitoring of the academic quality of departments and programs sponsoring candidates.

When it takes place: The DBO can take place at any time of year you choose. It is typically scheduled once coursework is complete, which could be the end of 1st year for some students. It must be scheduled by 24 months into the program.

Key Advice: As you take classes, consider who might be good examiners. Before you start asking examiners to take part and set up dates, check the overall composition with the program office to ensure that it meets school criteria using this form. Set aside about a month to prepare for this exam. Make sure to assemble a mock committee.

If you read the detailed SOM policy description, you’ll see two types of DBO exams; the BME PhD program uses the so-called ‘preliminary exam’. From the policy: “The purpose of the exam is to test the depth and breadth of the student’s knowledge and reasoning abilities. The scope of such an examination cannot and should not be sharply defined. [The student’s DBO Committee] can determine the limits of the exam by reviewing the student’s formal coursework along with requirements of the school, group, department, or program”. Although the focus of the exam is most commonly the course work that the student has completed, rather than their proposed research, it is typical for the student to give a brief (five minutes at most) overview of their research so as to help the committee assess relevant scope for questions.

Scheduling the DBO
The graduate student proposes to the Program Directors a list of Oral Examination Committee Members (use this form). The Directors may amend or reject the list; therefore, it is important that before the members are contacted, the student first get the proposed committee approved by the Program Directors. Upon approval of the list by the director, the student then contacts the members and schedules an examination date and time with them. Although consultation between the student, faculty advisor, and directors regarding possible exam committee members is appropriate, final selection of committee members is the responsibility of the Program Directors.

Once the DBO is scheduled, the student should request cell phone numbers of the faculty members, in case they need to be contacted on exam day. The student should remind the faculty a week before, and then a day before the exam via email. These precautions can prevent major problems – the exam cannot proceed without all the faculty present!

Once the DBO is scheduled, the date and final committee composition must be submitted to the Program Administrators at least three weeks prior to the scheduled exam date. The Program Administrators then completes and submits a form entitled Oral Examination for the Ph.D. Degree for School of Medicine Programs to the School of Medicine Registrar’s Office. The three-weeks’ notice is a firm requirement set by the SOM Registrar’s Office.

Composition of the student’s DBO Committee
For BME, the composition of the Oral Exam Committee should be a balance of faculty with expertise in the mathematical and biological sciences, so that the student is examined in both areas. At least 2 committee members must be from inside the BME department, and at least 2 committee members must be from outside the BME department. Primary appointment governs ‘inside vs outside’, but thesis advisors are always considered ‘inside’ even if appointed elsewhere. Two alternate members are also selected, for a total of seven faculty members. It is strongly suggested that one alternate is inside BME and one alternate is outside BME. Alternates will only be called upon if one of the regular members of the committee is not able to serve at the day of the examination.

Who can sit on a DBO committee? Members are suggested by the student (in consultation with their advisor), selected by the Program Director, and approved by the Registrar. “To be eligible to serve on a DBO committee, a faculty member must hold a faculty appointment as a Professor, Associate Professor, Assistant Professor, or Lecturer in a [JHU] department/program. Such appointments may be regular or visiting, full-time or part-time” and research or tenure-
track. “At the discretion of the program, faculty members who leave the University may continue to mentor their former students for a period of five years with the approval of the chair of the department/program and serve on the oral exam committee.” **Exceptions.** “The Associate Dean for Graduate Biomedical Education must approve anyone not meeting these criteria” – see the school policy for details. The BME program strongly discourages exceptions on this.

**Committee Chair.** “The chair of the committee is selected by the Registrar, based on rank and seniority at rank. Only JHU full-time tenure track faculty holding the rank of Professor, Associate Professor, or Emeritus Professor, from outside the candidate’s department are eligible to serve as Chair of the DBO committee.” Ensure, therefore, at least one chair-eligible faculty member is on your committee!

**The DBO exam itself**

**Length of the Exam.** From the policy: “The examination should be long enough for the committee to learn as much as it needs to judge the student’s qualifications as a Ph.D. candidate. Ordinarily, examinations should be under two hours, but committees are free to set their own time limits.”

**The exam.**

1. The chair of the examination committee will introduce the committee members.
2. Candidate will be asked to leave the examination room. The faculty advisor will make a brief introduction of the candidate. The committee members may review the candidate’s formal course record at this time.
3. Candidate re-enters the examination room and the exam commences. The candidate is not required to provide a presentation of their research (though in practice a 5-minute overview is typical). Typically, each committee member will conduct a 10-15 minute question session.
4. The candidate leaves the exam room, and the committee decides the outcome of the exam (typically by consensus; by vote if necessary). The chair records the outcome on the original form and each committee member signs the form. The chair should also sign and date the form.
5. The candidate re-enters the exam room and the chair informs them of the outcome, and discusses next steps if necessary.
6. The chair must give completed form to the program administrator directly following the examination. The form is NOT to be given to the student (this is a rule of the Registrar’s office). The program administrator is responsible for sending the original form to the Registrar’s Office within one week of the exam date.

**Outcomes of the exam.**

**Unconditional pass** – examination is passed, committee is discharged.

**Conditional pass** – the exact terms of the conditions are to be reported clearly and specifically (including time frames) on the examination form. Conditions could include taking or retaking courses; further reading and discussion with one or more committee members; or other conditions. As soon as all conditions have been met, the chair of the examination committee must write a letter to the Associate Dean of the Registrar of the School of Medicine informing them that the condition has been removed, with a copy to the Program Director and the Program Administrator. The committee is then discharged.

**Fail** – the examination committee, through the chair, should recommend a course of further action: (1) No further examination, resulting in dismissal of the student; or (2) Re-examine the candidate by the same committee at a later date; a second failure will lead to dismissal; or (3) Re-examine the candidate by a different committee at a later date. Reasons should be given for the membership changes, and the newly formed committee must have representation from the previous committee. A second failure will lead to dismissal."
Appendix B – Guidelines for the written Thesis Proposal

This proposal should be developed in collaboration with the thesis advisor, but written by the trainee.

**Note** that for parts 2 and 3 (see the list below) of the proposal, we typically use the same format as the scientific portion of an NIH Pre-doctoral Fellowship (NRSA) application (i.e. 1 page specific aims and 6 pages of research approach), but other equivalent formats, such as American Heart Association pre-doctoral fellowships, are permitted.

Well-written thesis proposals have sufficient detail to allow a faculty member other than your mentor to review the proposal without having specialized knowledge or needing to refer to previous publications. Brevity and clarity are important. Documents are formulated with minimum margins of 0.5 inches and a minimum font size 11. Follow the format below:

1. **Title Page (one page).** Title, Author, Names of Committee Members, plus: two-sentence summary of Public Health Significance; and two-sentence summary of Proposed Research.

2. **Specific Aims (one page).** State the specific purposes of the research proposal and the hypotheses to be tested.

3. **Research Approach (six pages) includes:**
   - **Significance.** Sketch briefly the background to the proposal. State concisely the importance of the research described in this application by relating the specific aims to broad, long-term objectives. Use this section to provide an account of any preliminary studies that might demonstrate the utility of the proposed project as a training experience.
   - **Innovation.** What is new? This could include approaches, data sets, or new reagents or knowledge to be generated by the proposal.
   - **Approach.** Provide an outline of: Research design and the procedures to be used to accomplish the specific aims; Tentative sequence for the investigation; Statistical procedures by which the data will be analyzed. Potential experimental difficulties should be discussed together with alternative approaches that could achieve the desired aims.

4. **Literature cited.**

5. **NIH-style biosketch.**

6. **Path to graduation (one page).** Estimate of time remaining to graduation, annotated with work to be done including: milestones; classes, training or travel to be undertaken; anticipated manuscript and grant/fellowship submission. This one-page overview should be updated and distributed at subsequent thesis committee meetings.
Appendix C – Graduation Requirements and Procedures

Summary of Graduation requirements.
The requirements for a PhD from the university are (link):

1. Dissertation (research thesis written, approved, and submitted to the library)
2. Residence (at least two consecutive semesters of full-time study – all students meet this requirement)
3. Oral Exam (successfully passing the DBO)

The additional requirements for the school and/or program are:

4. attend two semesters of BME seminars (typically, during first year)*
5. 30 credits of relevant courses (min. 12cr life sciences/medicine; min. 12cr engineering/quantitative sciences; min. 3cr substantial theory content)
6. ethics/RCR course (Introduction to Responsible Conduct in Research) - 1st year and 5th year
7. ethical challenges in BME course – 1st year
8. annual Individual Development Plans (IDPs)
9. one teaching or teaching assistant experience
10. annual thesis committee meetings starting in year following DBO (e.g. 3rd year if DBO was in year 2)
11. thesis proposal (written document and presentation)
12. research defense (permission to write meeting)
13. public defense (final presentation)

IDPs are required every year including first year.

Maximum time to degree. As of 2019, the maximum time to degree for a JHU PhD is 9 years; official leaves of absence (e.g. for internships or health reasons) are not included in the calculation.

Typical timeline. The DBO is typically taken once classes are completed, at least 12 and no more than 24 months after matriculation. The first thesis committee meeting should take place six months after the DBO, and annually thereafter. The thesis proposal should take place by the end of year three, and no later than the end of year four.

SOM policies
This document describes in detail School of Medicine policies on required components for graduation, and should be carefully read. Other SOM policies are linked in Appendix E.

Submission of the Approved Dissertation and Related Forms
The following documents must be delivered to Program Administrator sufficiently in advance of the SOM Registrar’s deadlines for each potential graduation date; to ‘walk’ in May, that is typically mid-to-late March.

- One complete copy of your thesis with your CV appended.
- Letters from both of your readers (typically, this is one letter signed by both readers; one reader is your advisor) approving the Dissertation in its present form and describing in detail (1-2 paragraphs) the contribution you have made to new research and knowledge
• The Graduate Student Clearance Form (form maintained by SOM - link)
• Completion of the SOM degree requirements worksheet (form maintained by SOM - link)

Documents required by the Registrar for graduation, to be submitted within two weeks of the degree completion date:

• Completion of degree requirements worksheet signed by student and program director (linked above)
• Student’s CV
• Copies of Doctoral Oral Board Exam (all attempts)*
• Abstract of Thesis
• Names of Advisor and Reader
• Readers’ Letter
• Certificate of Completion
• Email confirming delivery of thesis to the Eisenhower Library
• Graduation Clearance Form (linked above)
• Completed Survey of Earned Doctorates
• Proof of completion of Research Ethics requirement if not previously supplied to Registrar

*The program will have these for you.

Electronic Dissertations

Publication of a dissertation is a requirement for the Ph.D. degree. Traditionally, publication has been accomplished by depositing a copy of the dissertation in the university library, and then sending a copy for microfilming by ProQuest, an independent publisher. This is the model still used at many universities across the country. The digital revolution is changing traditional models of scholarly communication. Internet technology allows easy and widespread distribution of information. It permits immediate dissemination of a scholar’s work, but it also increases the risk of unwanted and unauthorized disclosure. This document outlines a set of principles to underlie the electronic publication of Ph.D. dissertations at Johns Hopkins. The principles balance the intellectual property rights of students against the mission of the University – to produce knowledge for the world. They fit the decentralized culture of Johns Hopkins.

Starting September 1, 2013, students will be required to deposit an electronic copy of their dissertation in the University repository. Instead of bringing paper copies of the thesis or dissertation to the library, you will submit a PDF via a special JHU electronic thesis or dissertation (ETD) web portal. You will login to the portal using your JHED ID, enter some contact information about yourself, enter some information about the dissertation (title, keywords, abstract, etc.), and upload the PDF. The library will do some brief format checking and then approve the submission or email you about necessary changes. The ETD will not be visible to the public at this point.

To submit your dissertation, go to here and sign in with your JHED credentials. You will be asked for some basic information about yourself and the department (email, phone, address, defense date, your committee members), as well as about your dissertation (title, abstract, and keywords). There is a size limit to the dissertation: no individual files can be larger than 512 MB and the total size of all files cannot be larger than 4 GB.

At the end of each semester, the library will make the ETD available to researchers around the world via a digital repository. Your research can make an immediate impact in your field. In rare cases, you may need to delay public access to your dissertation because of patent concerns or a pending publication derived from your dissertation. In such circumstances, you will be allowed to embargo your dissertation for a period of up to four years. In most cases the embargo will be short, if at all. Extensions beyond four years may only be granted by your school’s graduate academic board.

In addition to distributing the ETD through the JHU repository, you have the option to make your ETD available through the ProQuest Dissertations & Theses database. The web site library.jhu.edu had guides available on ETD.
Copyright. It is the considered legal opinion of the General Counsel’s Office that faculty and students must obey copyright law, and in particular, that dissertations should respect copyright. This implies that students must seek permission to include in their dissertations intellectual property that belongs to others. The dissertation is a scholarly work, so scholarly standards of attribution and credit should apply. The dissertation is a stand-alone document that represents the culmination of a student’s Ph.D. studies. Every effort must be made to secure permissions for copyrighted material. If that is not possible, an exception maybe claimed under the “fair use doctrine.” The Library and the General Counsel will develop a guide to help students and advisors understand what constitutes fair use, and what does not. An electronic copy of a student’s dissertation will be made available to Library patrons and to the Johns Hopkins community for scholarly purposes. This will be the definitive version of the dissertation. A second copy will be made freely available over the internet through the Library’s electronic repository. The Library will arrange for a click-box to indicate that the dissertation is to be used for scholarly purposes only. In general, the two versions of the dissertation will be identical. In the rare case that copyright permissions cannot be secured, or that the use of copyrighted material is so extensive that fair use cannot be claimed, the public version may appear without the copyrighted material, or with the material appropriately altered. When that occurs, the public version must indicate where the changes were made. Students are encouraged to copyright their dissertation for their own protection.

Dissemination. With rare exceptions, the electronic dissertations must be available without restriction through the University repository. However, there are occasionally legitimate reasons to withhold dissemination for a finite period of time. These include patent and other intellectual property concerns, as well as issues pertaining to later publication of a book derived from the dissertation. For these reasons, a student should be allowed to embargo his or her dissertation for a fixed period of time: either zero, one, two, three or four years. The default is to have no embargo. The Board expects that in most cases the embargo period will be short, if indeed there is an embargo. At the end of four years, the student could petition his or her school’s appropriate graduate academic board to extend the embargo. The Ph.D. Board believes that a high bar should be set for such extensions. The Board requests that each school prepare a report describing the extensions it has granted at the conclusion of each academic year. An embargo should never be available to a student whose dissertation contains plagiarized material.

ProQuest. ProQuest offers the student an opportunity to publish his or her dissertation via its services. ProQuest then pays the student royalties for the work. ProQuest also maintains a database of all dissertations produced nationwide. The database is a valuable tool for scholars in certain disciplines. The ProQuest publication agreement must be read carefully. For example, ProQuest reserves rights to repackage and resell dissertations under their control, which some students find objectionable. Moreover, in the library community, there is increasing resistance to a business model in which universities give intellectual property to organizations like ProQuest, and then have to buy it back each year through subscriptions. For all these reasons, going forward, ProQuest participation will be optional for JHU students. For some students, ProQuest adds value, so those students should be free to participate. But for other students, ProQuest represents an obstacle that should be removed. The ProQuest database, though, offers value to the academic community because it contains a record of all U.S. dissertations. Therefore the Ph.D. Board requests that the Library continue to send all dissertation metadata (author, title, abstract) to Proquest for inclusion in their database.

Terminal Masters Degree
Some students choose to complete their studies without completing all the requirements of the PhD. This may be due to changes of intention, of external circumstances, or failure to meet departmental requirements for progress toward dissertation. The SOM policies on the awarding of such terminal Masters degrees are here. Briefly, along with the residency requirement, awarding the Masters requires completion of all required courses and either (a) passing the DBO, or (b) a research essay. The program requires that this essay report on research conducted by the student with scientific novelty and significance, as certified in a signed letter by the student’s mentor and co-signed by the program director. A published or submitted manuscript is often accepted in lieu of a separate essay.

Once the decision to obtain a Terminal Master’s degree is made, students will have three months to complete the requirements and submit the thesis to the MA/PhD Committee, at which time they will cease enrollment and depart the
university. If it is not possible to complete the requirements in three months, the student may elect to take a leave of absence.

Dismissal Procedures from the BME PHD program

Students who are in the pre-DBO phase. The DBO examination is expected to be taken by the end of the second year of matriculation, and in no case later than 30 months after matriculation. During the pre-DBO period the graduate student is expected to make significant progress toward completion of the course requirements and selection of a thesis laboratory. Significant progress in completion of courses is defined as completion of at least 70% of the total course credit requirements for graduation with a mark of B- or higher by the end of the second year. If the graduate student does not meet this requirement, he/she will be placed on probation. The BME PHD Program Director will state the reason for this probation in a letter to the student, indicating the courses requirements that the student must meet in the probationary period. The Program Director will evaluate the progress of the student at the end of the probationary period and will do one of three things: (a) remove the student from probation, (b) extend the probationary period, or (c) dismiss the student from the academic program. The student may appeal this decision in writing within five business days to the Department Director. The Department will continue funding the student during the appeal process, provided that the student continues with his/her duties.

Dismissal without Probation. A student may be dismissed without a formal probation period under the following circumstances: (1) if they fail a DBO examination and the DBO committee determines that the student will not be allowed to re-take the exam; (2) if they fail a DBO examination, the DBO committee determines that the student will be allowed to re-take the exam but upon re-examination fails again; or (3) if they are expelled pursuant to allegations of misconduct.

Students who are in the post-DBO phase. The Thesis Committee and the student should hold meetings at a frequency of at least once a year. During this time the student presents their research results, and plans for conclusion of PhD. If the Thesis Committee determines that the graduate student has failed to meet minimum academic or research requirements, or that the research progress is inadequate, they may be placed on probation. This requires a formal letter to the student and the BME PHD Program Director providing an outline of the student’s academic or research shortcomings, indicate the corrective measures necessary to remain in the program, and state the length of the student’s probationary period.

Length of the Probation. If the probation is related to research progress and cannot be resolved with coursework, the probation period must span at least 8 work weeks before a final decision can be made. The Thesis Committee is at liberty to provide a longer probationary period.

Academic and Research Probation Final Decision Process
1. If the probation can be resolved with coursework: As soon as possible, but no later than one (1) month following the conclusion of the stated probationary period, the graduate program must inform the student of their status based upon whether the student has met the requirements as stated in the probation letter. The options are as follows:
   a. Remove the student from probation.
   b. Extend the probationary period and define/clarify additional terms as needed.
   c. Dismiss the student from the graduate program.
2. If the probation is related to research progress: Within one (1) week following the conclusion of the stated probationary period, the graduate program must inform the student as to whether they have met the requirements as stated in the probation letter. This decision should be informed by the student’s thesis advisor and the student’s thesis committee members. The options are as follows:
   a. Remove the student from probation.
   b. Extend the probationary period and define/clarify additional terms as needed.
   c. Remove the student from probation but transition the student’s funding from the current thesis research lab to the program or the advisor’s department. The student may remain in the graduate program and seek another lab and thesis advisor within a specified timeline. The program offers the option of a minimum of two one-month rotations
to select another laboratory. The program Co-directors will notify the student regarding the terms of this transition of funding support.

d. Dismiss the student from the graduate program

The Thesis Committee must meet with the student at the end of the probationary period and inform the student and the BME PHD Program Co-Directors whether the student has met the requirements as stated in the probation letter. The recommendations of the Thesis Committee to the Program Director are as follows: (a) remove the student from probation, (b) extend the probationary period, or (c) dismiss the student from the academic program.

A student may be subject to disciplinary action, including dismissal, based on any other Johns Hopkins University policies, including the student’s graduate program policies, the Student Conduct Code, the Office of Institutional Equity, Discrimination and Harassment Policy and Procedures, or the Johns Hopkins University School of Medicine Academic Integrity Policy.

In the event that a graduate program is made aware of issues of student misconduct, they are to notify the Associate Dean for GBE, follow the procedures delineated in SOM and University policies, and report to appropriate offices as needed, e.g., the Office of Institutional Equity regarding allegations of Title IX violations, or the Office of Policy Coordination regarding allegations of research misconduct. The graduate program will maintain any allegations of professional or other misconduct in a confidential manner and share the information only with the department chair and SOM administration, as needed, to resolve the issue.

Student disciplinary action, including suspension or dismissal, under any other Johns Hopkins policy will be processed through that policy’s procedures. The student’s graduate program and the Associate Dean for GBE will be informed by the cognizant university office and may be required to facilitate academic administrative functions related to a student’s disciplinary action or the student’s departure.

**Dismissal Appeal Procedures.** A student may appeal the dismissal within five business days to the Program Director with a letter stating why they feel this decision is unmerited. The program must render a decision on the appeal within five business days. The student may then appeal that decision within five business days to the BME Department Director with a letter stating why they feel this decision is unmerited. The Department will continue funding the graduate student during the appeal process, provided that the student continues with their duties.
Appendix D – Rights and Responsibilities of PhD Students

Statement of the Rights and Responsibilities of Ph.D. Students at Johns Hopkins University (2011)

The following statement is university policy regarding Ph.D. students: Statement of the Rights and Responsibilities of Ph.D. Students at Johns Hopkins University or in web form here (and accompanying note from President Daniels and then-Provost Minor here). We reproduce it here for ease of access.

Ph.D. education is fundamental to the University’s teaching and research mission. For an intellectual community of scholars to flourish, it is important to acknowledge the principles that underlie the compact between Ph.D. students, the faculty, and other members of the University community. It is in this spirit that the Doctor of Philosophy Board, in collaboration with faculty and students from across the University, has articulated a statement of rights and responsibilities for doctoral students at Johns Hopkins. The principles described in this document are to be realized in policies established by the various Schools of the University; the Schools will also develop mechanisms to monitor and enforce such policies.

RIGHTS

1. Ph.D. students have the right to education, supervision and training. This includes access to the classroom, laboratory and teaching opportunities necessary for completion of degree requirements, appropriate and regular faculty supervision consistent with the norms of the discipline, as well as appropriate research and/or clinical experiences.

2. Ph.D. students have the right to full and regular access to information about the requirements for the degree. This includes information regarding program requirements, assignment/selection/change of advisor, expected time to completion, graduation rates, and conditions of financial support.

3. Ph.D. students have the right to conditions of learning, teaching and research that are appropriate and reasonable for their discipline. This includes the right to information and ongoing consultation regarding their expected effort and specific duties, as well as clearly stated criteria for participation in collaborative work and/or research.

4. Ph.D. students have the right to be treated in a respectful and professional manner by all members of the University community. This includes freedom from discrimination and harassment as well as assurance of reasonable confidentiality in their communications, as governed by university policy.

5. Ph.D. students have the right to receive, on a regular basis, written evaluation of their progress and to be informed of the criteria upon which the evaluation is based. Students should also be provided with opportunities to discuss such evaluations with their advisor. Each program should make available their policies concerning academic probation, funding withdrawal, and dismissal; reasonable warning should be provided in advance of dismissal based on failure to make satisfactory academic progress.

6. Ph.D. students have the right to appropriate recognition for their contributions to research and scholarship. This will require discussion between the student, advisor and other relevant parties regarding expectations for student contributions and the nature of the recognition.

7. Ph.D. students have the right to academic freedom. This includes the right to express, without reprisal, independent opinions about scholarly issues (such as opinions regarding theoretical and methodological debates in their disciplines), opinions regarding matters of institutional policy, concerns about suspected research misconduct and personal opinions on public matters.

8. Ph.D. students have the right to have their views represented in the development of policies that govern the Ph.D. Student ideas and perspectives should be solicited and considered if substantive changes in the structure of a Ph.D. program are anticipated.

9. Ph.D. students have the right to clearly defined policies regarding benefits and nonacademic issues pertinent to their student status. These policies should cover (but not be limited to) such things as the provision of health care, recognition of family responsibilities, leave, vacation and other absences. These policies should acknowledge that students can, without reprisal, form clubs, associations or organizations around common interests, as long as these are consistent with general non-discrimination policies of the University.
10. Ph.D. students have the right to accessible procedures for redress of their grievances. Each School within the University must provide mechanisms to ensure that grievance procedures are fair and without reprisal. These procedures should include Ph.D. student representation, as appropriate.

RESPONSIBILITIES

1. Ph.D. students have the responsibility to inform themselves of the requirements of their programs.
2. Ph.D. students have the responsibility to dedicate appropriate effort and time to meeting the requirements of their programs.
3. Ph.D. students have the responsibility to uphold the ethical responsibilities of their profession and discipline. This includes honesty in academic coursework and scholarship, integrity in the use of grant and fellowship funds, and the upholding of ethical norms in the conduct and reporting of research methods and results.
4. Ph.D. students have the responsibility to treat all members of the University community in a respectful and professional manner.
5. Ph.D. students have the responsibility to contribute to the intellectual life of the University and to the advancement of education and scholarship.
6. Ph.D. students have the responsibility to understand and fulfill their role in developing and maintaining a professional relationship with their faculty advisor(s). This includes the responsibility for communicating regularly with advisors, maintaining a mutually agreed upon schedule of meetings, and informing advisors of such things as: the current status of their degree work; any expected deviations from the agreed upon program of studies; and any unanticipated absences.
7. Ph.D. students have the responsibility to recognize the contributions to their research and scholarly publications made by their advisors and other colleagues. This will require communication and consultation with these individuals about the nature of the recognition.
8. Ph.D. students have the responsibility to fulfill their teaching, research and/or clinical commitments and duties in a responsible manner. This includes the responsibility to inform themselves of the requirements of these positions, to maintain the established ethical standards of interaction with students, faculty, patients and/or research participants, and to respect the privacy of information shared with them.
9. Ph.D. students have the responsibility for the appropriate use of university resources and equipment.
10. Ph.D. Students have the responsibility to abide by the established rules and policies of their program, school and the University.

BME PhD Mentoring Agreement
The BME PhD Mentoring Agreement can be found here.

The BME doctoral program at JHU requires PhD students to identify a mentor by the end of their first year in the program. Once a student and mentor mutually agree that there is a good fit for the thesis research, this form is used for the student and mentor to confirm the mentor-mentee relationship. Please see the form for full details described in the agreement for both student and mentor.

University Policy on Mentoring Commitments for PhD Students and Faculty Advisors (2019)
The following statement is university policy regarding Ph.D. students: JHU Mentorship Commitments of Faculty Advisors and PhD Students. We reproduce it here for ease of access. Our program expects both faculty and students to follow through on these commitments.

This document outlines mentoring expectations of faculty advisors and of PhD students at Johns Hopkins University and in the BME department.

These expectations should be discussed together. By taking on a BME student the advisor agrees to follow the BME department mentoring guidelines

Faculty advisors should commit to the following responsibilities:
Training:

• The PhD advisor has the responsibility to mentor the PhD student. This responsibility includes committing to the training of their PhD student, building on the PhD student’s individual professional background and in support of their individual professional aspirations.

• The PhD advisor has the responsibility to participate in ongoing and regular meetings with their advisees to discuss academic and research progress. The advisor and student should agree on expected frequency of and preparation for meetings and use meetings to brainstorm ideas, troubleshoot challenges, and outline next steps. The advisor should identify a co-advisor/mentor should the primary advisor be unavailable for an extended period (sabbatical, leave, etc.).

• The PhD advisor has the responsibility to participate in a formal annual meeting with the student to discuss academic progress and next steps in the academic program. This responsibility includes helping to ensure that the document summarizing this annual discussion is completed and submitted in accordance with program requirements.

• The PhD advisor has the responsibility to encourage their advisees to reach out, as relevant, to additional co-advisors or informal mentors.

• The PhD advisor has the responsibility clarify the student’s funding package and to clarify any work and/or teaching expectations associate with the package.

• The PhD advisor has the responsibility to contribute to a training environment that fosters independent, scholarly research, and professional growth.

Research:

• The PhD advisor has the responsibility to provide guidance in scholarly research. This responsibility includes helping to identify a workable research project and helping to set reasonable goals and timelines for research completion. The advisor should encourage the student to expand their skill sets and share ideas with others at Johns Hopkins and externally.

• The PhD advisor has the responsibility to monitor research progress. The advisor should encourage effective use of time. The advisor should meet regularly with the PhD student to hear updates on progress, results, and challenges in activities and research.

Professional development:

• The PhD advisor has the responsibility to discuss career development with the PhD student, including in any number of sectors of interest to the student. PhD advisors should assist in identifying resources to further the student’s professional goals.

• The PhD advisor has the responsibility to participate in a formal annual meeting with the PhD student to discuss professional development goals. The advisor should help to ensure that the document summarizing this discussion is completed and submitted in accordance with program requirements.

• The PhD advisor has the responsibility to nominate the student for relevant professional opportunities and try to connect their advisees to relevant professional contacts and networks.

• The PhD advisor has the responsibility to allow time outside of research for student engagement in professional development activities including, for example, skill building workshops, professional conferences, additional research collaborations, or other informational sessions.

Respectful engagement and well-being:

• The PhD advisor has the responsibility to treat their advisees, other students, and colleagues with respect at all times.
• The PhD advisor has the responsibility to commit to being available to meet with the PhD student. The advisor and the student should agree on expected frequency of and preparation for meetings, and expected timeframe for responding to emails and for providing feedback on work products. The PhD advisor should give their full attention during meetings and should reach out to PhD students who are not making contact.

• The PhD advisor has the responsibility to be supportive during both successful and discouraging periods of training.

• The PhD advisor has the responsibility to communicate in a respectful and constructive manner, including if the advisor has concerns that the PhD student is not meeting the expectations outlined in this document. This responsibility includes using concrete and specific language when providing suggestions or critiquing work.

• The PhD advisor has the responsibility to take an interest in the student’s well-being, to listen to any concerns, and to connect the student, as appropriate, with additional resources.

**Policies:**

• The PhD advisor has the responsibility to become familiar with and respect University, school, and program policies for PhD students. The advisor will acknowledge all PhD student benefits and entitlements, including, as relevant, paid and unpaid leave.

• The PhD advisor has the responsibility to discuss with the student relevant policies, commitments, and expectations related to funding, work, research assistantships, teaching assistantships, sick leave, or vacation.

**Responsible conduct:**

• The PhD advisor has the responsibility to become familiar with university and professional codes of responsible conduct for PhD students. This responsibility includes reporting any possible violations as required to relevant parties, including to the relevant Dean’s office and to the Office of Institutional Equity.

• The PhD advisor has the responsibility to discuss and help clarify authorship or intellectual property issues and appropriately recognize the student’s contributions to any collaborative work.

• The PhD advisor has the responsibility to model professional behavior in both interpersonal interactions and in scholarly integrity.

• The PhD advisor has the responsibility to complete Title IX Training regarding sexual misconduct and sexual harassment as required by the University. [http://oie.jhu.edu/training/](http://oie.jhu.edu/training/)

**Continuous quality improvement as an advisor:**

• The PhD advisor has the responsibility to participate in mentor training and best practices discussions. This responsibility includes striving to be a better mentor and to learn tips and practices that improve their work and skills as an advisor.

• The PhD advisor has the responsibility to ask advisees for constructive feedback on mentoring. This responsibility includes doing their best to respond professionally to these suggestions and consider whether or how best to incorporate them into their mentoring interactions.

**PhD students should commit to the following responsibilities**

**Training:**

• The PhD student has the primary responsibility for the successful completion of their degree.

• The PhD student has the responsibility to familiarize themselves with academic milestones and to strive to meet all milestones within the expected timeframe.

• The PhD student has the responsibility to meet regularly with the PhD advisor. This responsibility includes providing the advisor with updates on the progress, outcomes, and challenges in coursework, research, and academic or professional activities. The advisor and the student should agree on expected frequency of and
preparation for meetings, and will use meetings to brainstorm ideas, troubleshoot challenges, and outline expectations for work and timelines.

- The PhD student has the responsibility to participate in a formal annual meeting with the advisor to discuss academic progress and next steps in the academic program. The student should ensure that the document summarizing this discussion is completed and submitted in accordance with program requirements.
- The PhD student has the responsibility to seek additional mentors to expand their training experience, as appropriate.
- The PhD student has the responsibility to understand their funding package and to clarify any work and/or teaching expectations in line with this funding.

**Research:**

- The PhD student has the responsibility to work with the advisor to develop a thesis/dissertation project. This responsibility includes establishing a timeline for each phase of work and striving to meet established deadlines.
- The PhD student has the responsibility to seek guidance from their advisor, while also aspiring increasingly for independence.
- The PhD student has the responsibility to engage in activities beyond their primary research responsibilities. The student should attend and participate in any research-related meetings and seminars relevant to their training area.

**Professional development:**

- The PhD student has the primary responsibility to identify their professional goals and to develop their career plan following completion of the PhD degree. This responsibility includes familiarizing themselves with professional development opportunities within Johns Hopkins and externally. Students should identify specific activities to pursue that will advance their professional development and networking.
- The PhD student has the responsibility to prepare a Professional Development Plan annually that outlines their research and career objectives. This responsibility includes discussing this plan annually with the advisor. The student should ensure that the document summarizing this discussion is completed and submitted in accordance with program requirements.

**Respectful engagement and well-being:**

- The PhD student has the responsibility to treat the advisor, other mentors, and colleagues with respect at all times.
- The PhD student has the responsibility to make themselves available, within reason, to meet with the advisor upon request.
- The PhD student has the responsibility to communicate in a respectful and constructive manner if they have concerns that the advisor is not meeting the expectations outlined in this document.
- The PhD student has the responsibility to be open to constructive criticism by the advisor, other mentors, and colleagues.
- The PhD student has the responsibility, as possible, for their well-being, should consider discussing any concerns with the advisor or other mentor(s), and should connect with available resources when needed.

**Policies:**

- The PhD student has the responsibility to familiarize themselves and comply with University, school, and program-specific policies and requirements for PhD students.
- The PhD student has the responsibility to discuss with the advisor relevant policies, commitments, and expectations related to funding, work, research assistantships, teaching assistantships, sick leave, or vacation. As needed, the student will provide any documentation relevant to stated policies on leave and other requirements to
the student’s program, school, or the University.

**Responsible conduct:**

- The PhD student has the responsibility to conduct themselves in a responsible and ethical manner at all times.

- The PhD student has the responsibility to familiarize themselves with University codes of responsible conduct for PhD students.

- The PhD student has the responsibility to engage in responsible research conduct. This responsibility includes completing the responsible conduct of research training requirements of their specific school and program, and any specific discipline training requirements (e.g., animal and human subject work). The student will maintain accurate and contemporaneous records of research activities in accordance with the norms of best practices in their own discipline. The student should discuss authorship and intellectual property issues with the advisor.

- The PhD student has the responsibility to complete Title IX Training regarding sexual misconduct and sexual harassment as required by the University. [http://oie.jhu.edu/training/](http://oie.jhu.edu/training/)
Appendix E – Important JHU and SOM Policies

Some of these policies are School of Medicine (SOM) policies, some are JHU-wide; others are BME-specific. All PhD programs at JHU are periodically reviewed by the Doctor of Philosophy board, and policies may be instituted by the office of the Vice Provost of Graduate and Professional Education. Graduate programs and graduate student welfare at the SOM is the remit of the Office of Graduate Biomedical Education, and the various basic sciences graduate programs of the SOM and their policies are discussed regularly by the MA/PhD committee. All policies relating to SOM Graduate Biomedical Education can be found at this link (Hopkins Policy Finder). We also link to specific key policies here.

Enrollment in the Emergency Alert System is mandatory. See this link for details on how to enroll.

SOM policies relevant to the conduct of research, such as Biosafety, Animal Care and Use, and more, are here.

Registration and student status
To be classified as a graduate student in the School of Medicine, the student must be admitted to a graduate program, be registered on a full-time basis and be on campus. Status as a Special Student is awarded only to graduate-level students who are not candidates for a Johns Hopkins advanced degree; time as a Special Student may not exceed 1 year. Once students begin their graduate course of study toward a degree, they must complete a minimum of two consecutive semesters of registration as a full-time, resident graduate student. In order to be registered full-time, a student must engage in a full-time program of courses, seminars and/or research* as approved by the graduate program. The School of Medicine does not define full-time in terms of credits, courses, or any other such unit. To qualify as a resident student, the student must be present on campus and working toward fulfilling the requirements for the degree.

The program certifies each student’s status at the beginning of every academic year, and students must register each semester from matriculation through graduation. A student’s departure from the School of Medicine without an approved leave of absence will be deemed a permanent withdrawal from the student’s program. If on leave, students are expected to provide the Registrar’s Office and their program with an updated current address, and are expected to respond to all communications and mailings within the deadlines specified. Students who withdraw from the program must be formally readmitted, at the discretion of the Program Director, before they may return to the School of Medicine. If readmitted, they need not pay a second application fee but must pay all outstanding fees. Failure to register by the published deadlines of the School of Medicine may be interpreted as a withdrawal from the program.

*our PhD students are registered for research year-round, and therefore are full-time students even when not taking other classes

Maximum time to degree. As of 2019, the maximum time to degree for a JHU PhD is 9 years; official leaves of absence (e.g. for internships or health reasons) are not included in the calculation.

Advice on graduate student timelines (updated 6/28/2019)

Student hours and leave policies
Graduate Student Hours/Time Off/Vacation/Sick Leave Policies (Updated 9/17/2016). For leave of absence, read the linked policy in full; briefly, the Program Director approval is required for leave of absence. The signature of the Director of International Student and Scholar Services may also be required if the student is an international student. A student may request a voluntary leave of absence for reasons including medical reasons (including mental health), family responsibilities, and internships. Leave may not exceed 2 years. Student does not receive stipend during the leave, and the student must retain health insurance during LOA through the Student Health Program, which is covered by the advisor or the program, unless alternative arrangements are made.

BME PhD Handbook, updated August 2022
Mentoring

Statement of the Rights and Responsibilities of Ph.D. Students at Johns Hopkins University (2011 – see also text in Appendix D)

JHU Mentorship Commitments of Faculty Advisors and PhD Students (2019 – see also text in Appendix D).

Conflict Resolutions Procedures in the Context of the Relationship Between Faculty Mentors/Advisors and Graduate Students (updated 2/26/2020)

Academic Integrity

Academic Integrity Policy (updated 1/31/2018)

Graduate Student Honor Code (updated 10/01/2018)

Other useful policies

Outside employment & Consulting policy (updated 7/30/2019)

SOM policy on interaction with industry (updated 6/30/2010)

Intellectual Property Policy (JHU) (2011)

University Policy on Family Educational Rights and Privacy (FERPA)

JHU policy on Personal Relationships (updated 7/1/2019)

Useful SOM forms for Graduate Students

Useful SOM forms for Graduate Students

Learner Mistreatment Policies

Grievance Procedure for Faculty, Fellows, and the Student Body (updated 5/20/2019)

Policy on Conduct in Teacher/Learner Relationships and Learner Mistreatment (Learner Treatment Policy) (updated 07/28/2020)

Learner Mistreatment – responsibilities of learners (updated 2/1/2018)

Reporting mistreatment

Building a community means treating each other with respect. When people do not live up to this, it’s important to call it out. Bullying, harassment, racism, and other unacceptable behaviors should be reported, whether it comes from faculty members, students, or staff; and whether you or someone else is the victim of this behavior.

You have multiple possible people/institutions you can report to:

- Program Co-Directors (Patrick Kanold and Rachel Karchin, BMEPhDCoDirectors@lists.johnshopkins.edu)
- Department Director (Michael Miller, mim@jhu.edu)
- Associate Dean for Graduate Biomedical Education (Peter Espenshade, peter.espenshade@jhmi.edu)

SOM mistreatment reporting ([http://mistreatment-reporting.med.jhmi.edu/](http://mistreatment-reporting.med.jhmi.edu/))

**Mental Health and Counseling Resources**

If you are having difficulty, ask to talk to your mentor or ask to talk to the program director – any time. The graduate students of BME EDI have put together an excellent guide to mental health resources at JHU. Student Assistance Program (SOM/SPH/SON):

[http://www.hopkinsmedicine.org/uhs/SAP](http://www.hopkinsmedicine.org/uhs/SAP)

Counseling Center (KSAS/WSE): [http://www.jhu.edu/~ccenter/](http://www.jhu.edu/~ccenter/)