

POLICY BOOK

Biochemistry, Cellular and Molecular Biology Graduate Program

**The Johns Hopkins University
School of Medicine**

<http://bcmb.bs.jhmi.edu/>

Revised September 2016

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The Biochemistry, Cellular and Molecular Biology Graduate Program (BCMB) was established in 1977 and offers outstanding training to young scientists in the fields of biochemistry, cell biology, molecular biology, biophysics, physiology, pharmacology and neuroscience. The program objective is to provide students with a breadth of knowledge and research experience to eventually initiate an independent and productive research career in the biomedical sciences. Training is accomplished through the integration of a set of standard course requirements and research in individual laboratories.

BCMB serves as the major training program for seven Johns Hopkins Institute for Basic Biomedical Science (IBBS) departments: Biological Chemistry, Biophysics and Biophysical Chemistry, Cell Biology, Molecular Biology and Genetics, Neuroscience, Pharmacology and Molecular Sciences, and Physiology. It is an interdisciplinary program with approximately 100 faculty members actively involved in research and teaching.

ADMINISTRATION

STRUCTURE

A faculty member directs the BCMB program. The Director provides overall leadership of the program, appoints committee chairs, advises students, and serves as the chair of the BCMB Policy Committee. He/She supervises the BCMB Program Manager who implements policies and procedures on a day-to-day basis with the help of an Admissions Coordinator and an Academic Program Assistant.

DIRECTOR SELECTION

Nominations for a new director are solicited from the IBBS community. Nominees are presented to the seven BCMB department chairs to select a director. The term is five years, and it can be renewed. Dr. Carolyn Machamer has been the program director since 2006.

POLICY COMMITTEE

The Director acts in conjunction with a Policy Committee, consisting of one member from each of the seven BCMB departments and one student member. The Policy Committee meets monthly to oversee major policy initiatives such as curriculum and qualifying exam changes. A voting majority makes decisions. Policy Committee members are elected to renewable five-year terms by the entire faculty of their department. Members will rotate off, or be re-elected to a new term, by May of the year listed below. No members will rotate off the committee in the year the Director changes. A student representative and an alternate are elected to one year, renewable terms. The alternate usually serves as the representative the following year.

STEERING COMMITTEE

The Steering Committee was formed to approve the admission of new faculty to the program who are joint appointees in one of the BCMB departments. The Steering Committee is composed of Policy Committee members, core course directors, and the chair of the Admissions Committee. The Director calls an ad hoc meeting of the Steering Committee as needed, and decisions are made by majority vote.

Current Program Leadership

| Staff | Policy Committee | Admissions Committee | Core Course Directors |
|---|---|---|---|
| <u>Academic Manager:</u> Arhonda Gogos <u>Admissions Coordinator:</u> Sharon Root <u>Program Assistant:</u> Christina Bailey | <u>Program Director:</u> Carolyn Machamer Erin Goley (2021) Cynthia Wolberger (2017) Geraldine Seydoux (2017) Caren Freel Meyers (2017) Angelika Doetzlhofer (2021) Steve Claypool (2017) Bramwell Lambrus (student rep, 2016) Kayarash Karimian (alt) | <u>Admissions Director:</u> Sin Urban Seth Blackshaw Steve Claypool Angelika Doetzlhofer Andrew Ewald Erin Goley Andrew Holland Takamari Inoue Erika Matunis Geraldine Seydoux J Sohn Herschel Wade Will Wong Natasha Zachara | L. Mario Amzel Cynthia Wolberger Rachel Green Erika Matunis James Stivers Sarah Wheelan G. Will Wong Hiromi Sesaki |

BCMB FACULTY: MEMBERSHIP AND PARTICIPATION

EXPECTATIONS FOR FACULTY PARTICIPATION

Faculty members with primary appointments in one of the seven BCMB departments are automatically members of BCMB. Some members of these departments whose research area falls outside of BCMB have chosen not to participate, however (e.g. the Systems Neuroscientists). In addition to mentoring students in their labs, program members are expected to participate annually in at least three BCMB activities including: teaching in core or elective courses, interviewing perspective students during recruiting, serving on oral exam and thesis committees, serving on the admissions committee, attending the annual retreat, leading proposal writing workshops, and attending student rotation presentations. Other opportunities include serving on the policy committee, running a core or elective course, and organizing the retreat. Failure to participate can result in labs being closed to new students or dismissal from the program.

MEMBERSHIP

Other faculty members often wish to join BCMB. These new members enrich and broaden the program, and offer new possibilities for students. Yet as the size and scope of the program increases, it becomes increasingly difficult to fulfill the program mission. Concern about the increasing demand for joint appointments led to a policy to accommodate the increasing number of requests. These guidelines are subject to review.

Procedure for admission of unaffiliated faculty members into BCMB:

1. Faculty members with a primary appointment in any one of the seven BCMB departments will always be automatic BCMB members, unless they choose not to be.
2. Any new BCMB member will be held to the same requirements, standards and review process as current BCMB members.

3. Any faculty member with a secondary appointment in a BCMB department or a primary appointment in a non-participating basic science department (Biomedical Engineering and Molecular and Cellular Pathobiology) can apply directly to the BCMB program for membership. The nomination/application should include the following documentation:
 - a. Cover letter from the applicant that addresses:
 - i. How the research program would complement and strengthen those areas already covered in BCMB
 - ii. How the applicant will contribute to the BCMB program
 - iii. How the applicant contributes to other graduate programs and the number of past and present graduate students.
 - b. CV of applicant
 - c. History of grant support
 - d. Letter of nomination from relevant basic science department director, including the significant basic research accomplishments of the individual and the relevance of the research area to the BCMB program.
 - e. Letter from the applicant's department chair that addresses
 - i. how students would be supported beyond training grant coverage
 - ii. lab environment and training support (*i.e.* where is the laboratory, how large is it, what equipment is exclusively available)
 - iii. the percent effort the faculty member is expected to devote to research

The BCMB Steering Committee will conduct an annual review of applications for membership in the program. Applications will be considered once a year with a deadline of June 1 for submission. Approval will require a majority vote of the committee, in the absence of members of the nominating department. No more than six applications will be approved in a given year. Following its review, the Steering Committee will forward its recommendations, together with all applications, to the Basic Science Directors, who will make a final decision regarding membership.

The awarding of secondary appointments in basic science departments continues to follow the procedures of the individual departments and is separate from the secondary appointee's application to the BCMB program.

No new faculty outside of the participating Basic Science Departments will be promised BCMB participation as a condition of employment at the Medical School. They will be considered for participation in BCMB only after they have joined the Hopkins faculty.

Joint appointees will be periodically reviewed. The extent to which the appointee has shared in BCMB teaching will be heavily considered. Joint appointees are expected to offer an elective course with no more than one co-organizer every three years that is actually taken by BCMB students. Alternatively, at least two lectures should be given annually in a core courses or a section of "Method and Logic" should be taught every three years in order to remain eligible to take students. Note that teaching of medical students does not fulfill the teaching requirement.

SELECTION AND TERM OF CORE COURSE DIRECTORS

1. The term for the directors of the core courses is 5 years. A course director may choose to continue for additional 2-year period(s), with approval of their departmental director and the policy committee. To select a new course director, the current course director and the department director(s) will consult to choose the most appropriate person, and submit their recommendation to the policy committee for approval.

2. Each core course director is encouraged, but not required, to pick a co-director.
3. In exceptional circumstances when no BCMB program faculty member has the necessary expertise to be a director for a certain course, then a non-BCMB member can be selected for this role. The decision lies with the policy committee.

BCMB PROGRAM REQUIREMENTS FOR STUDENTS

OVERVIEW

Year One Student Requirements

Foundations of Modern Biology Core Course (eight modules)
 Core Discussion
 Method ,Logic and Experimental Design Course
 Ethics and Career Development Course
 Two Elective Courses
 Three Laboratory Rotations with Two Presentations

Year Two Student Requirements

Proposal Writing Workshop
 Qualifying Examination
 Thesis Proposal and Thesis Committee Meeting

Years Three and Higher Student Requirements

Four Elective Courses
 Journal Club and Seminar Participation
 Thesis Research, Annual Thesis Committee Meetings, Dissertation and Thesis Seminar

MSTP AND MD/PHD STUDENT REQUIREMENTS

Medical Scientist Training Program (MSTP) and MD/PhD students who elect to complete their PhD degree in the BCMB Program are exempt from certain requirements because they have been fulfilled through the first and second year medical curriculum.

1. Students are required to complete (or test out of) all the first year Core Course modules and complete the Ethics course, the Method and Logic course and the Proposal Workshop.
2. Students are required to complete two elective courses of their choice during their BCMB tenure.
3. Students are permitted to begin their thesis research in the fall of their first year.

YEAR ONE REQUIREMENTS

The Foundations of Modern Biology Core Course is comprised of eight modules held during the first three quarters of the academic year:

Biochemical and Biophysical Principles
 Macromolecular Structure and Analysis
 Molecular Biology and Genomics
 Genetics
 Organic Mechanisms in Biology
 Bioinformatics
 Pathways and Regulation
 Cell Structure and Dynamics

The Core Course modules, with the exception of Bioinformatics, are 16 lectures each. Bioinformatics is eight lectures. Courses are held from 9:00 - 10:30 am each day (M-F). All modules are graded. These modules are open to all graduate students enrolled at the Johns Hopkins School of Medicine and a certain number of slots will be kept open for other graduate program students for each module.

Course Descriptions

Biochemical and Biophysical Principles

The physical and chemical principles underlying biological processes are presented and discussed. Topics include thermodynamics, chemical equilibrium, chemical and enzymatic kinetics, electrochemistry, physical chemistry of solutions, and structure and properties of water. Elementary concepts of statistical thermodynamics are introduced as a way of correlating macroscopic and microscopic properties. The course director is Dr. Mario Amzel.

Macromolecular Structure and Analysis

The structure and properties of biological macromolecules are presented. Experimental and computational methods used to study macromolecular structure including X-ray crystallography, magnetic resonance, spectroscopy, microscopy, and mass spectrometry are also covered. Dr. Cynthia Wolberger is the course director.

Molecular Biology and Genomics

This course module covers the molecular Biology and Genomics of both prokaryotes (using *E. coli* as the model organism) and eukaryotes, with a focus on “model organisms” including yeast, flies, worms, mice as well as humans. Both the Molecular Biology (reductionist) perspective and the Genomics (systems biology) perspective is provided on each topic, and there is heavy emphasis on mechanism and regulation of fundamental processes in biological information transfer DNA-> RNA-> protein. This module covers genes and genomes, transcription and RNA processing, translation, the RNA world, replication, chromosome structure and function and genome instability. The course director is Dr. Rachel Green.

Genetics

This module covers fundamentals principles of genetics, focusing primarily on yeast, the fruit fly, and the mouse. Problem sets are an integral learning tool in this course. The course director is Dr. Erika Matunis.

Organic Mechanisms in Biology

This course deals with the chemical mechanisms of enzymes. It is intended to illustrate how catalysis in biological systems can be understood using principles derived from organic reaction mechanisms. The course director is Dr. James Stivers.

Bioinformatics

This course provides an introduction to bioinformatics, the combined field of molecular biology and informatics (information science and technology). The course focuses on the analysis of proteins, genes, and genomes. Topics include DNA and protein sequence analysis, database searching (including BLAST), phylogeny, proteomics, and microarray data analysis. The course director is Dr. Sarah Wheelan.

Pathways and Regulation

This course will cover the principles of membrane transport, bioenergetics, metabolic pathways, cell cycle and cell death with particular emphasis on regulatory mechanisms including receptor-

mediated signaling, small GTPases, lipid molecules, kinases and phosphatases. The course director is Dr. Guang William Wong.

Cell Structure and Dynamics

The objective of this course is to provide the basics of cell biology, including the structure, function and biogenesis of cellular organelles. Also covered are essential concepts on the cytoskeleton, cell-cell and cell-extracellular matrix interactions, cell motility, chaperones, and protein turnover. The course director is Dr. Hiromi Sesaki.

Core Discussion

BCMB students are divided into small groups and meet with faculty members once each week to discuss a research article related to the Core Course modules under study. Core Discussion is flexible and is structured at the discretion of the Core Course directors. The Director of each core module organizes the sessions that correspond to their material. This course is open only to BCMB students, but the materials are provided to other programs to use in similar discussion courses.

Each faculty leader assigns a student weekly participation score (Plus (+) for a well-prepared student with active participation, Zero (0) for an average but not stellar level of contribution, Minus (-) for little or no active participation). A student must actively participate to receive a pass.

Teaching Assistants for Core Course Modules

In the fall of 2004, BCMB implemented problem sets to reinforce the major concepts in the core modules and to provide an additional grading mechanism so that the full grade did not rely solely on the one exam at the end of each module. The TAs are selected by the core module directors and the cost is shared by the various graduate programs. The cost for the TAs for each module will be totaled and divided by the number of students enrolled in the module to determine a "TA cost per student," per module. This rate will be multiplied by the number of students in each graduate program to determine the TA cost per program, per module. The program manager will charge each graduate program for their total TA cost.

Method, Logic and Experimental Design

This course is exclusively for first year BCMB students, and is held in the fourth quarter of Year 1. Trainees discuss research papers that involve a current controversy or introduce a new experimental paradigm. Rigor and reproducibility, including the proper use of statistics, is considered during each discussion. The goal is to learn to critically evaluate experimental results and to design controlled experiments.. A passing grade of "B-" or higher is required. The course director is Dr. Carolyn Machamer.

Responsible Conduct in Research Training

"BCMB Ethics and Career Development in Science" Is a small group discussion course focuses on responsible conduct of research in science and preparedness for a science career. The topics discussed are: Diversity and Inclusion, Mentoring, Misconduct (Plagiarism, Falsification and Fabrication), Authorship, Scientific Recordkeeping, Conflict of Interest and Intellectual Property, Oral Presentations, and Animal and Human Experimentation. The course director (Carolyn Machamer) coordinates the participation of two different BCMB faculty members for each weekly discussion session. This course is only open to first year BCMB students, and meets one day a week for eight weeks in the fourth quarter. The format is informal luncheon discussions based on

case studies and other material, approximately 1.5 hours in length. Grading will be Pass/Fail based on student participation and attendance.

Related to responsible conduct, students sign a general SOM Honor Code upon matriculation. There is also a specific **BCMB honor code** that is signed in the presence of the Program Director during individual meetings at the beginning of the first year.

First Year Elective Courses

Students select two elective courses to complete in the fourth quarter of their first year. Electives include Neurobiology, Epigenetics, Developmental Biology, Immunology, Transcription Mechanisms, Great Experiments in Biology, Genome Rearrangements, Structure Determination, Virology, Nuclear Structure and Human Disease, HIV Biology, The Cytoskeleton, Membrane Traffic, Cell Migration, Topics in RNA Biology and Mammalian Histology.

Some electives are given every year, while others are offered every other year. All electives are graded courses, and most are discussion-based.

Electives are usually held from 9:00 -10:30 but the final schedule is up to the instructor. First year BCMB students must take one elective during the first half of the quarter, and another elective during the second half. (M-F). Elective courses are open to all graduate students enrolled at the Johns Hopkins School of Medicine. Enrollment priority is 1) first year BCMB students 2) advanced year BCMB students 3) other graduate students. A student may not transfer credits counted toward a different degree (e.g., a Master's degree earned before joining the BCMB program) to fulfill the electives requirement.

Lab Rotations

First year BCMB students complete three 10-week lab rotations (see below for early matriculation and summer rotations). To help students choose rotation labs, faculty members present their research in short talks during the first weeks of the academic year and at the Retreat, and can also participate in a poster session held in the 2nd week. Advanced year students also present posters at the on-site poster session and at the Retreat.

The lab rotation assignment process is designed to encourage students to explore different disciplines within BCMB, and prevent more than one student from rotating in a lab at a time (for the first two rotations). Students submit a ranked list of 4 BCMB faculty members with whom they would like to work for the first rotation (September-December). Choices are entered into a computer program that does the assignments for the rotation, one student per faculty member.

A student who lists a first ranked faculty member NOT listed by any other student is automatically assigned to that lab. If more than one student lists the same first ranked faculty member, the computer randomly assigns one of the students to the lab. The student/s that did not get matched to that person will be matched to their second choice, if available. The program maximizes students' first and second choices.

This same process is followed for the second rotation (January-March. For the third rotation (March-May), students can rotate in any BCMB lab, as long as the faculty member agrees, and there is no limit as to how many students the faculty member can accept. This ensures students can rotate in labs of their choice sometime during the first year. Students usually select a thesis lab from one of their rotations at the end of the third rotation. Occasionally, a fourth rotation is performed.

Faculty members are surveyed prior to each rotation period to determine if they are able to take a rotation student, and certain labs may be closed. Labs may also be closed to rotation students if a second year student has not held an initial thesis committee meeting, if advanced year students are delinquent for their annual thesis committee meeting, or if the lab has two 7th year students or one 8th year (or higher) BCMB student.

Students are expected to explore all opportunities of joining a laboratory within the BCMB program. In the rare occasion when a student chooses to join a lab outside the BCMB program, then the program will not cover their stipend for a second year. Instead, their mentor must agree to assume their support for their second year through completion of the requirements for the Ph.D. degree. Additionally, the student must identify a co-mentor who is a member of the BCMB program. The departmental affiliation of the co-mentor determines the departmental affiliation of the student.

Early Matriculants

Some BCMB students chose to matriculate early to work in a BCMB faculty member's lab during the summer prior to their first year in the BCMB Program. Students arrange for this experience with the faculty member directly. The faculty member must agree to pay for the student's stipend and insurance until the BCMB Program begins financial support at the beginning of the academic year.

A summer lab experience that is full-time and six weeks in length (i.e. begin by July 15) will qualify for rotation credit. The faculty member is responsible for informing the BCMB Program Manager two weeks prior to the student's start date that a student will matriculate early. They also need to provide a budget number to cover the stipend and insurance costs.

Students who complete a summer rotation must still complete the two fall rotations like other BCMB first year students, and submit ranked choices. Then they may select their thesis lab, without doing a spring rotation.

MSTP and MD/PhD Student Rotations

MD/PhD students usually complete rotations before entering a graduate program and are permitted to choose their thesis lab without additional rotations. Their stipend is covered only for the first year, and their mentor must agree to assume their support for their second year through completion of the requirements for the Ph.D. degree.

Lab Rotation Presentations

At the end of the first rotation, the students are split into two groups: group one presents a talk on his/her lab project, and group two prepares a poster presentation on his/her project. The students are advised on how to make an effective PowerPoint presentation and how to prepare a poster. Following the second rotation, the groups switch, and group one prepares a poster, and group two presents a talk.

The posters are displayed in the same room the talks are held, and many other students, faculty, and post-docs attend the presentations.

Lab Rotation Evaluations

Following each lab rotation the faculty member is asked to complete an evaluation of the student's performance, which becomes part of the student's file. One part of the evaluation is shared with the student. The BCMB Manager reviews these evaluations with the Director. If all

three evaluations for a student are positive at the end of the year, the student receives a "Pass" grade for the research course.

Lab Selection

At the end of the third rotation, students are asked to select a laboratory for their thesis. In rare occasions, and with the permission of the program director, students may be allowed to do a fourth rotation.

Students may decide to have co-mentors. In this case both faculty must agree to share the responsibility of advising the student and providing bi-annual research grades and financial support after the second year. If the co-mentors are affiliated with different departments, the student must select one of the two departments for his/her affiliation.

First Year Grade Policy

The Director and Program Manager closely monitor the grades on all examinations in the core modules. After the first year, students are evaluated by the qualifying exam, by their preceptor, and their thesis committee.

First year students may receive one or two C grades (core modules and electives) with no administrative consequences. They must re-take the course/s the following year and receive a "B" or higher grade. First year students receiving a C or lower in a first year elective have the option of repeating the same course or enrolling in a different first year elective course the following year.

Failure to receive a B- or higher grade after repeating a first year course, will result in dismissal from the program.

If a first year student receives three or more "C" grades or below in the Core Course modules and first year electives, they will either:

1. Move to the Master's track with the opportunity to repeat the courses the following year. If they receive a "B-" or higher in these courses, they will return to the PhD track.
2. Be asked to leave the program.

Once a student receives a "C" grade, it may be possible to allow the student to focus on their course work and not complete their lab rotation, making up the rotation the following summer.

Passing grades of "B-" or higher in all first year Core Course modules and electives must be received prior to preparing for the oral qualifying exam. Tutoring is available for students having difficulty.

First Year Advisors

The Program Director and the Academic Program Manager both advise each first year student, helping with rotation choices and academic issues.

YEAR TWO REQUIREMENTS

Oral Qualifying Examination

Following the successful completion of all first year requirements, students prepare for the Doctoral Board Qualifying Examination. The examination does not focus on the subject of the student's research, but covers the general principles covered in the first year core modules. Exams are held in December of the second year, unless courses need to be retaken.

General Format

The qualifying exam consists of two stages. First, students are required to write an independent NIH-style fellowship proposal on a topic outside of their thesis area. The topic is based on a recently published paper. Second, students are required to defend their proposal before an oral exam committee. The proposal serves as a starting point for questioning, however, questions are not necessarily limited to the proposal.

The goals of the exam are: (1) to test the depth and breadth of knowledge; (2) to test the student's ability to synthesize the material covered in the coursework; and (3) to test the ability of the student to formulate and interpret experiments to test specific hypotheses. The overall goal of the exam is to assess the student's readiness to undertake a PhD thesis project.

Research Proposal

Each student submits a proposed topic for his/her research proposal and a short description of his/her thesis project eight weeks prior to the exam to the Program Director. This procedure ensures that the topics of students' proposals are sufficiently distinct from their thesis research so that they can formulate their ideas independently.

Proposal Workshop

Students are required to participate in a course designed to guide them in preparing the research proposal for the oral exam. These sessions are organized by Carolyn Machamer, and consist of two classes followed by two (or three) small group workshops. Students are given advice on picking a topic, formulating hypotheses, and designing an experimental strategy. They are then divided into small groups (usually 3 students each) to work with a faculty leader in preparing their proposals. In the first workshop, each student describes the background and experimental approach they are considering, and all members of the group are expected to give feedback. In many cases, the experimental plan and even topic change after this type of discussion. If necessary, another workshop to discuss the experimental plan is held. In the final workshop, first drafts of each proposal are critiqued.

The proposal is prepared with the following guidelines (single-spaced, 12 point Times or 11 point Arial):

Specific Aims: 1/2 page

Background: 2-3 pages

Proposed Experiments: 3-4 pages, including these sections for each Aim: Rationale, Experimental Approach, Expected Outcomes & Interpretation, Possible Problems & Alternative Strategies

References (to key primary literature)

Figures (diagrams, models, etc.): no more than 2 pages

Excluding references and figures, maximum 7 pages.

Students can also work with their mentors to formulate the best hypotheses and methods to test them. However, the mentors are not allowed to help with the writing of the proposal. Students submit the completed research proposal to the Program Manager for distribution to the exam committee two weeks prior to the exam date.

Oral Exam

Students are initially examined on their research proposal, although questions are expected to extend into other areas to explore the student's depth and breadth of knowledge. Exams are held during December. For students who need to retake courses, the oral exam will be delayed

until all courses have been passed. These students participate in the proposal workshop with their classmates, however.

Exam Committees

Each exam committee consists of five assigned BCMB faculty members and two alternative BCMB faculty members to substitute if an assigned member is unavailable on the day of the exam. Two members and one alternate are from the student's department, while the three other members and another alternate are from other BCMB departments.

The BCMB Program Manager assigns the exam committees with assistance from the Program Director, and students are not allowed to select or veto any member. A list of the committee members is sent to the SOM Registrar, where the committee is authorized and the chair is assigned. Students are given a list of the faculty on their specific committee when they turn in their proposal. The student's advisor cannot serve as a committee member, but he/she is present at the beginning of the exam to briefly review the student's research progress for the committee.

Exam Scoring

Following the exam, the student is asked to leave the room.

The chair asks faculty to give the student two numeric scores, in writing, before any comments are made or discussion ensues. Committee members assess the student's performance by writing down a score on a scale of 1 to 5, with 1 being the highest performance rating, and 5 being the lowest. A rating of 3 is the minimum score for an unconditional pass.

Score 1 - the faculty member rates 1-5 on the question/s he or she asked the student

- 1 - outstanding, superb answer/s
- 2 - very good, solid answer/s
- 3 - adequate, passable answer/s
- 4 - questionable answer/s
- 5 - unacceptable answer/s

Score 2 - the faculty member rates 1-5 on the overall performance of the student

- 1 - outstanding, superb answers
- 2 - very good, solid answers
- 3 - adequate, passable answers
- 4 - questionable answers
- 5 - unacceptable answers

The chair reviews these scores and then discussion ensues. The quality of the written proposal is also taken into consideration. The committee makes the final decision to pass, pass with a condition, or fail. All committee members sign an oral exam form with the outcome stated by the committee chair. The original is delivered to the School of Medicine Registrar's Office and a copy to the Doctoral Board Office.

Exam Outcomes

The Doctoral Board allows three possible outcomes of the qualifying exam: unconditional pass, conditional pass, or fail.

Unconditional Pass

No further action is required; the student is now a candidate for the Ph.D. degree.

Conditional Pass

If the outcome is a conditional pass, the chair must detail on the exam form the specific condition the student must fulfill, a time frame, and who will determine if the condition has been successfully met (usually the chair of the committee). The chair will write a follow-up letter to the Doctoral Board stating either that the student has met the condition and passed the exam or that the student did not meet the condition and that the situation has been referred to the BCMB Director.

Examples of recommended conditions:

- Student writes a paper or report to strengthen a weak area
- Student studies a textbook or other reference(s) and is examined by individual committee member(s) on this topic
- Student rewrites the proposal

Examples of *non*-recommended conditions

- Student takes or re-takes a course (could take a year to satisfy condition)
- Student is re-examined by entire committee (this should be a "Fail")

The original committee approves the fulfillment of whatever condition was assigned, as represented by the committee chairperson. The committee's final decision must be a pass or fail, and should normally take place within 3 months of the original exam.

Fail

If the outcome is a fail, the BCMB Policy Committee recommends that the chair state on the exam form that the student will be re-examined by a new committee made up of 2-3 members from the Policy Committee, the original committee chair, and 1-2 members of the original committee within a given time frame (usually 3 to 6 months). The candidate must receive a Pass or Conditional Pass on the second attempt. A second failure will lead to dismissal.

Thesis Proposal and Thesis Committee Selection

After successfully passing the qualifying exam, students begin to prepare for their first thesis committee meeting. The meeting is held in the spring of the second year (unless the oral exam is delayed due to retaking of courses, in which case it must be held within 4 months of passing the oral exam). Each class is given a specific deadline by which students have to complete their first thesis meeting. Each student prepares a thesis proposal in the format of an NIH fellowship application. Preliminary data can be included if available, but are not required.

If a student does not meet the deadline, then they will be expected to have a meeting as soon as possible and they will be placed on academic probation. Additionally, the student's laboratory will not be open to accept new rotation students until the meeting is held. If the student does not meet the deadline for a second year, this will be grounds for dismissal from the program.

Students ask faculty to serve on their thesis committee. Committees consist of three faculty members who are experts in the student's area of research, and their thesis advisor. Committee members do not need to be members of BCMB. A "thesis committee form" is signed by all committee members to document the meeting. One member of the committee will be chosen as chair (cannot be the advisor). The chair is responsible for completing the evaluation and summary sections of the form, with consultation from all committee members. At the first thesis meeting, evaluation of the thesis proposal should be included in the evaluation. Students are responsible for scheduling their thesis committee meetings, but in case of difficulty the program office will help.

Student Individual Development Plans

The BCMB policy committee has implemented a new process to make sure each student has an individual development plan (IDP). This process includes a mentoring meeting between the student and the advisor that must occur annually before the thesis committee meeting. To facilitate the discussion, the two parties complete the mentoring form separately, discuss their notes at the meeting and create an action plan. The advisor and the student should keep a record of the forms and the action plan.

The thesis committee meeting form has a box to check to ensure that the mentoring meeting has been held. Additionally, at the end of the thesis committee meeting, the advisor must leave the room so that the student can talk alone with the committee members.

YEARS THREE AND HIGHER REQUIREMENTS

Electives

Advanced year students are required to take four elective courses to further broaden their knowledge. Students usually fulfill their elective requirements during their third and fourth years of training. Courses must be taken for a grade. They may be taken pass/fail if that is the only grading option. Credit will not be given for audited courses. Most upper level seminar courses offered by faculty in the School of Medicine are considered as one elective, however, a limited number of courses with an extensive number of lectures and requirements count as two elective courses, with the program director's approval. Credit will be granted if a student receives a grade of B- or higher.

Courses taken in other Hopkins schools, such as Public Health or Engineering, or summer courses at Cold Spring Harbor Laboratory or the Marine Biological Laboratory, can receive credit as electives with the Director's approval. If not previously approved as an elective, the course description and syllabus must be provided for the Director to review. The courses must be "substantial" and contribute the student's scientific training. Courses that are taken as part of a concurrent degree (e.g. a Master's degree) may not be used to fulfill the electives requirement.

2nd year and above students are advised to take only one elective course at a time. The BCMB office will require confirmation that the advisor granted permission if a student registers for more than one elective in the same quarter. The only exception will be graduating students who need to complete the electives requirement in a short period of time.

Journal Club and Seminar Participation

Students are encouraged to attend and participate in departmental seminars and Journal Clubs. BCMB trainees are expected to attend at least one seminar per week offered by one of the seven participating departments. These seminars are usually presented by outside speakers. In addition, trainees are expected to participate in their departmental Journal Club where current journal articles are discussed jointly with faculty and postdoctoral fellows (the lab group meeting does not meet this requirement).

There is no BCMB registration or grade for seminar and Journal Club participation, however, a student's department may require registration and assign a grade.

Thesis Research

All BCMB trainees are required to register for a "research" course each fall and each summer. This course reflects the work the student is doing in the lab and is graded by their advisor.

Annual Thesis Committee Meetings

The mentoring meeting continues to be an annual requirement before each thesis committee meeting. Following the initial thesis committee meeting in year two, students are required to meet annually with their committees. Committee members may change as the research project warrants. Beginning for students entering the program in 2011, the annual meeting must be held by the date of the first meeting to remain in good standing in the program (e.g. if the first meeting occurs May 15 2013, all subsequent annual meetings must be held on or before May 15). The BCMB program office will send out reminders about 60 days in advance, but it is the student's responsibility to schedule the meetings. Scheduling well in advance is the only way to ensure meetings will be held by the annual date. For thesis meetings in year 3 and later, students prepare a short progress report, clearly outlining what was known at the last meeting, and what progress has been made since. In year 4, students are required to include a written thesis completion plan and future career goals in their update.

The thesis committee meeting form discussed above is completed by the chair of the thesis committee, and submitted to the Program Manager to document each meeting. Feedback from the faculty is a valuable aid to students for completion of the program in a timely manner. These forms also serve as written feedback for each student regarding their research progress. If the form is not received, the student's laboratory will not be open to accept new rotation students until the meeting is held and reported. The form from the previous meeting will be distributed to the committee members in advance of the next meeting.

When a student is nearing completion of his/her research, the "final phase" box is checked on the thesis committee meeting form. A student in the final phase is expected to complete all experiments, write the dissertation and present the thesis seminar within 6 months. Since the final phase approval indicates that the student may write the dissertation when listed requirements have been met, it is important to prepare a careful list of requirements on the thesis form. This box should not be checked if the student has significant experimental work to complete. Failure to complete all requirements within 6 months will require that another thesis meeting be held.

After five years (4 thesis meetings), if a trainee is not in the final phase, they are required to meet with their thesis committee every six months, with a policy member present (usually the member from their department). The policy committee member writes a report for the BCMB Director, who will discuss the student's plan for completion with their advisor.

If a student is not in the final phase by 6.5 years (78 months after matriculation), they must prepare a written request for extension, co-signed by their advisor. The request should include a summary of work completed, work planned, and a timeline. The BCMB Policy Committee will review the request, and then the student and advisor will meet with the policy committee to explain the situation and answer questions. The policy committee will then vote on whether to approve the extension.

The same process must be followed at 7.5 years if the student has not reached the final phase.

A terminal Master's degree will be given if the PhD is not complete by the end of year 8, unless the policy committee approves an extension due to extenuating circumstances. Note that official leaves of absence are not included in the total training time.

To promote timely degree completion, labs with student(s) delinquent in annual thesis meetings will be closed to rotation students. In addition, faculty members with 2 or more students in year 7 or 1 student in year 8 will be put on probation and their labs will be closed to new students joining, until the students in year 7 or 8 graduate. Additionally, students interested in rotating in the lab should be informed of the probation. Labs of faculty members who receive two probations within a 5-year period will be closed to BCMB students for 3 years.

Annual BCMB Programmatic Meetings

Students are required to attend annual meetings with the program director. The topics have a different focus depending on year of training:

2nd year: Preparation for the qualifying exam

3rd year: Career Exploration (informal discussions led by BCMB graduates with different careers).

4th year: Degree completion information & how to find a postdoc or other job

5th year: Individual meetings with students not in "final phase" to develop completion plans.

Responsible Conduct in Research- additional training

Students entering year 6 (i.e. 4 years after their initial Ethics course) must take additional Responsible Conduct in Research Training. There are three ways to satisfy this requirement: (1) Participation in departmental Ethics discussions, held on specific topics once per year; (2) Participation in one of the two half-day sections of the SOM course "Introduction to Research Ethics", which is a combination of large group lecture and small group sessions, and meets for one half day in the fall and one in the spring; (3) Attend two Dean's lectures on Responsible Conduct of Research, held throughout the year. Participation in one of these three training experiences must be documented and will be recorded in each student's file.

Dissertation

Usually in year four or five, the student's thesis committee agrees that the student is nearing completion of his/her research. When a student receives a "**final phase**" check at the thesis committee meeting, they are expected to complete any remaining experiments, write their thesis, and get approval from their PI and reader (in the form of a signed readers' letter) within 6 months. The student's research is usually published in one or more scholarly journals prior to the dissertation being written. The institution requires that the dissertation is a "publishable body of work." The BCMB program expects that each student will publish at least two first author papers from their thesis work, but this is not an absolute requirement for graduation. Specific formatting guidelines must be followed for the dissertation, and are described on the JHU web site: <http://guides.library.jhu.edu/etd>.

In case of any disagreement between a student and their mentor, the student's thesis committee and the Program Director will make a final decision regarding degree completion.

Complete instructions for submitting the thesis and completing the final degree paperwork are available in the BCMB office and on the [BCMB website](#).

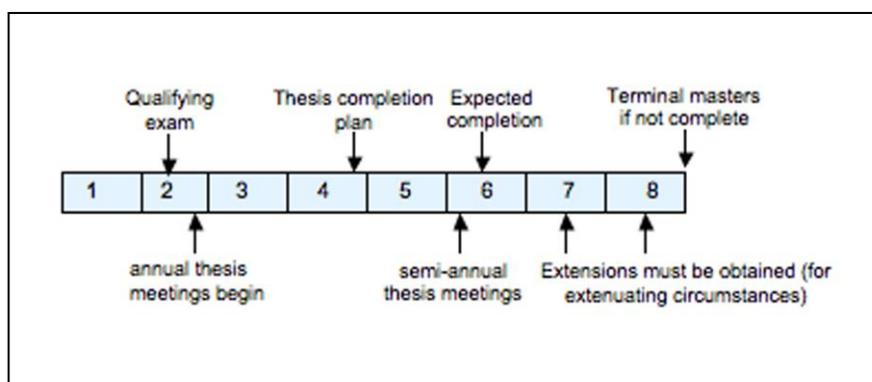
Thesis Seminar

The student presents a formal and public seminar on his/her completed thesis research to faculty members, postdoctoral fellows and other science trainees. Students cannot present their seminar until their thesis has been approved by their advisor and the second reader.

Additional Considerations for International Students

International students need to visit the International Office regarding their visa four months prior to their anticipated thesis completion date. Once degree completion paperwork is submitted, international students are not permitted to remain working in the lab unless they have been appointed as a postdoctoral fellow or research specialist

TRAINING TIME LINE (SUMMARY)



MASTER OF SCIENCE DEGREE

A student has the option to leave the BCMB Program with a Master of Science degree if:

- 1) He/She has successfully completed all first year requirements and unconditionally passed the qualifying exam, or
- 2) He/She has successfully completed all first year requirements and writes a Master's essay on research completed in year two.

ADDITIONAL PROGRAM FEATURES

The BCMB Program organizes or participates in a number of additional events that contribute to the richness of the graduate student experience.

BCMB RETREAT

The program sponsors a retreat each fall. The main purpose of the retreat is to foster scientific interaction between faculty and trainees in the program. The faculty and upper level students

present brief research talks and posters. This also aids first year students in selecting rotations. The informal retreat is held away from the Hopkins' campus in a relaxed setting.

RESEARCH COLLOQUIUM

Advanced students organize a monthly research colloquium for fellow trainees. Two students each month present their research in an informal setting with refreshments provided.

FELLOWSHIPS

There are a number of fellowship opportunities available for BCMB students. Most are eligible to apply for an [NSF fellowship](#) in their first or second year, and the BCMB program provides a workshop for interested students. After their second year, most students are eligible to apply for an [NIH NRSA fellowship](#). Additional opportunities include fellowships from the [American Heart Association](#), the [Ford Foundation](#), etc. Fellowship opportunities for international students include the [HHMI International Student Research Fellowship](#) and the [Boehringer Ingelheim Fonds fellowship](#).

If a student receives a fellowship award while funded by the BCMB program, the fellowship support cannot begin until the following academic year, so as to not interrupt the program funding structure. Exceptions can be made at the discretion of the BCMB program Director. NSF fellowships can be activated June 1 or September 1. BCMB Training grant appointments run through June 30, so the only possible date for activation is September 1.

Students who secure and begin an external fellowship that is nationally competitive and merit-based receive a one-time bonus of \$3,000, per School of Medicine policy. If the fellowship begins by the end of the first year of study (Sept. 1), the program will pay the bonus, otherwise the advisor is responsible.

AWARDS

Young Investigator's Day, a School of Medicine sponsored event, provides recognition and cash prizes to students who have conducted outstanding research. There are also annual first year student awards made from private funds (Turock, Drescher, Kelly Awards). Students can also win awards for the best Colloquium talk.

STUDENT LED SEMINAR

BCMB sponsors a student-run seminar. A volunteer committee of students choose and invite an outside speaker to visit Hopkins and host the speaker for lunch and dinner. The faculty supervisor for this annual event is Jeremy Nathans.

MINORITY SUMMER RESEARCH PROGRAM

The BCMB graduate program is interested in providing research opportunities for underrepresented undergraduates and actively participates in the SOM Summer Internship Program (SIP). Faculty members performing research in the broad areas defined by SIP guide students in new and ongoing research projects. The goal of the program is to encourage underrepresented minority students to pursue careers in Biological Research through exposure to a vigorous research environment. Students who have completed their junior or senior years are eligible. The duration of the program is 10 weeks (beginning mid-June), and a stipend is provided.

STUDENT FINANCIAL SUPPORT

The BCMB Program financially supports students for their first and second years with a stipend and medical and dental insurance. Funds for this are from an NIH Pre-Doctoral Training Grant and from the School of Medicine Dean's Office. The School of Medicine also provides tuition support.

In July of the 2nd year, the faculty advisor assumes stipend support of the student, as well as individual medical and dental insurance. Under certain circumstances, first or second year mentors can support students. Under no circumstances are these students exempt from any of the requirements of the program. If the faculty advisor loses funding and is unable to continue supporting a student, the faculty member's department is responsible. In rare cases when the department cannot cover the stipend and insurance, the program will be responsible.

Each year the number of offers extended to prospective graduate students by the BCMB Program exceeds the number of available stipends. Typically 30-40% of these students accept our offer and the program is able to guarantee support for these students for two years. Occasionally the acceptance rate is greater than expected. In this case, the director asks selected faculty to support their second year students. The following method will be applied to select these faculty:

1. The first laboratory selected to provide support will be that with the most students. The next laboratory selected will be that with the second most and so on.
2. No laboratory will be asked to support more than one second year student.

VACATION AND LEAVE POLICIES

The BCMB program follows the [policy for graduate student leave and voluntary leave of absence at the School of Medicine](#).

VACATION

Beyond the official University holidays and breaks, students may take three weeks of vacation. The mentor may grant additional time off.

SICK LEAVE

Students may take 15 days (3 weeks) of sick leave per year that can be applied to pregnancy and childbirth. Under special circumstances, this period may be extended by the program director or the advisor. Sick leave is not accrued. For medical leave of absence, health insurance will be paid by the program or advisor for up to one year.

Parental leave of 30 calendar days per year can be used for the adoption or birth of a child.

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

LEAVE OF ABSENCE

Time spent on a leave of absence is not counted toward the degree time limit. Students must apply for a leave of absence through their department or program and are encouraged to

include a letter of support from the Associate Dean of Graduate Student Affairs. A leave of absence is typically granted under circumstances in which medical conditions, family or personal hardship, or compulsory military service prevents a student from carrying out graduate studies. A leave of absence is granted for a specific period of time, and it may not exceed two continuous years.

ADMISSIONS AND RECRUITING

The BCMB program receives approximately 300 applicants a year (including foreign applications) for approximately 20 slots. There is an active recruitment program to encourage minority students to apply to the BCMB program, including annual recruiting trips to the major undergraduate minority science student conferences.

Dr. Sinisa Urban is the BCMB Admissions Director, and leads all recruitment efforts with the help of the BCMB Admissions Coordinator. The application deadline is December 5, at which time the Admissions Committee begins the selection process for the following year.

ADMISSIONS COMMITTEE

The Admissions Committee consists of two members from each of the seven participating departments. Each committee member is asked to serve a four to five year term.

The Admissions Committee assists the admission director in setting priorities for the admission process and in reviewing all of the BCMB graduate program applications. Foreign and domestic applicants are treated equivalently, as long as the applicant can come to Hopkins to interview. See below for international students who cannot travel to Baltimore for an interview.

INTERVIEW WEEKENDS

There are two interview weekends in the winter, usually at the end of January and the end of February. About 35-40 students attend each weekend. There is an effort made to match student's interest with the BCMB faculty who they want to meet.

Students arrive on Thursday night and stay through Sunday morning. Each applicant interviews with five members of the faculty on Friday, has dinner on Friday evening with students and faculty, attends presentations (posters and talks) on Saturday morning, goes on a tour of Baltimore with students Saturday afternoon, followed by dinner with students on Saturday evening.

Applicants who can travel to Hopkins, but who cannot make the dates of the interview weekends, have separate, one-day interviews with faculty arranged.

OFFERS

Candidates offered admission are required to respond before April 15. We encourage faculty members to call students who were made offers and encourage them to come to the BCMB program. The goal is to admit 20-24 students per year.

INTERNATIONAL APPLICANTS

Applicants who cannot travel to Hopkins for an interview have a different review process. Since many of these applicants come from China and India, a sub-committee made up of Asian faculty members reviews these applicants to narrow the field, and then conducts Skype

interviews. Several students from this pool are usually accepted into the program. The sub-committee meets after the regular admission committee meetings are done in January.

TRANSFER STUDENTS

Students can only transfer into the BCMB Program from another institution during the normal admission process. These students must satisfy all the requirements of the program, including lab rotations. A student transferring in the first or second year generally is offered a stipend at the time of transfer.

Students at Johns Hopkins transferring research training to a mentor within the BCMB program can be considered for admission to the program. If the student has completed all BCMB required coursework, under certain conditions, they can be admitted as a second year or above student (exempt from rotations).

STUDENTS OF FACULTY WHO LEAVE JOHNS HOPKINS UNIVERSITY

On occasion, faculty members change institutions; the following policy has been developed to ensure that all parties will cooperate in a responsible manner to make sure that individual students make timely progress toward degree completion deadlines.

Students admitted to the BCMB program will be permitted to move with an advisor if they meet the following criteria:

1. Must be a candidate in good standing who has passed the Doctoral Board oral exam, including meeting any conditions stipulated by the oral exam committee
2. Must have had at least the first thesis meeting

In addition, the following conditions must be met and agreed upon by all parties before the student will be allowed to move:

1. One member of the thesis committee must agree to be co-advisor.
2. Annual thesis meetings at Johns Hopkins (or by Skype or other video conferencing) must be held in order to remain enrolled in the program. The co-advisor will be the chair of the thesis committee. The BCMB program office can help with the scheduling and must be informed of the date. Note that semi-annual meetings are required starting 60 months after matriculation.
3. Failure to have an annual thesis meeting is a serious issue; it is viewed as a failure to progress and will lead to dismissal from the program.
4. Any remaining required elective credits may be taken at the new institution; documentation must be provided to the program office.
5. Students are encouraged to inform the director of the BCMB program of any extenuating circumstances that may interfere with their progress.
6. The thesis seminar must be held at Hopkins, and the advisor must be present.
7. The advisor, co-advisor and student must meet with the director to sign a document that agrees to these rules. Permission to move and remain in the program is contingent upon this agreement.

Students who move with advisors and meet all of the criteria and conditions above will receive the PhD degree from the Johns Hopkins School of Medicine.