BIOCHEMISTRY AND MOLECULAR BIOLOGY, PHD

Introduction

The PhD Program in the Department of Biochemistry and Molecular Biology is designed for students interested in graduate-level preparation for careers in biomedical and health sciences research. Emphasizing molecular studies of multiprotein systems, molecular and cellular biology, and biochemical nutrition, the research of our doctoral students has applications to cancer, aging, neurological diseases, and environmentally-based diseases.

Program Requirements

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

Required Coursework

All Ph.D. students in the training program have a common core curriculum during their first and second years as outlined in Table 1. Students who are supported by the National Cancer Institute training grant in their second year or beyond are also required to take ME.510.760 Fundamentals in Cancer: Cause to Cure offered by the Sidney Kimmel Comprehensive Cancer Center, or an equivalent course. Students should consult with the departmental Academic Program Manager regarding course availability.

A rich array of seminar programs and journal clubs are also available to all students. Students may also elect, in consultation with their thesis adviser, to take additional coursework in their chosen area of interest. In addition to registering for required coursework, students also register for thesis research once they have chosen a thesis adviser.

All students, regardless of year, are required to attend the bi-weekly BMB Seminar Series given on Mondays at noon throughout the academic year and the annual BMB Retreat. Students who have completed their first year of study are also required to participate in the weekly journal club and attend the monthly BMB Colloquium series each academic year.

Table 1. Course Requirements for BMB Ph.D. Students

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td><strong>First Year</strong></td>
<td></td>
<td></td>
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<tr>
<td><strong>First Term</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ME.100.709</td>
<td>Macromolecular Structure and Analysis (Macromolecular Structure and Analysis)</td>
<td>3</td>
</tr>
<tr>
<td>ME.100.710</td>
<td>Biochemical and Biophysical Principles (Biochemical and Biophysical Principles)</td>
<td>3</td>
</tr>
<tr>
<td>PH.120.850</td>
<td>Biochemical Techniques (laboratory rotations)</td>
<td>6</td>
</tr>
<tr>
<td>PH.120.852</td>
<td>Core Research Literature</td>
<td>2</td>
</tr>
<tr>
<td>PH.120.872</td>
<td>Special Studies-Current Topics in BMB</td>
<td>1</td>
</tr>
<tr>
<td>PH.120.840</td>
<td>Special Studies and Research Biochemistry</td>
<td>2</td>
</tr>
<tr>
<td>PH.550.860</td>
<td>Academic &amp; Research Ethics at BSPH</td>
<td>3</td>
</tr>
<tr>
<td><strong>Credits</strong></td>
<td></td>
<td><strong>17</strong></td>
</tr>
<tr>
<td><strong>Second Term</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ME.260.709</td>
<td>Molecular Biology and Genomics (Molecular Biology and Genomics)</td>
<td>3</td>
</tr>
</tbody>
</table>

ME.800.707 | Computational Biology and Bioinformatics (Computational Biology and Bioinformatics) | 3 |
ME.260.708 | Fundamentals of Genetics | 2 |
ME.330.709 | Organic Mechanisms in Biology (Organic Mechanisms in Biology - taken either year 1 or 2 at student’s discretion) | 2 |
PH.120.850 | Biochemical Techniques (lab rotations) | 6 |
PH.120.840 | Special Studies and Research Biochemistry | 2 |
PH.120.852 | Core Research Literature | 2 |
| **Credits** | | **20** |
| **Third Term** | | |
| ME.110.728 | Cell Structure and Dynamics (Cell Structure and Dynamics) | 3 |
| ME.360.728 | Pathways and Regulation (Pathways and Regulation) | 2 |
| PH.120.850 | Biochemical Techniques (laboratory rotations) | 6 |
| PH.120.840 | Special Studies and Research Biochemistry | 2 |
| PH.120.852 | Core Research Literature | 2 |
| **Credits** | | **15** |
| **Fourth Term** | | |
| PH.120.624 | Cancer Biology | 3 |
| PH.120.850 | Biochemical Techniques (laboratory rotations) | 6 |
| PH.120.840 | Special Studies and Research Biochemistry | 2 |
| PH.120.852 | Core Research Literature | 2 |
| **Credits** | | **13** |
| **Second Year** | | |
| **First Term** | | |
| PH.120.840 | Special Studies and Research Biochemistry (variable credit) | 1 - 22 |
| PH.120.820 | Thesis Research Biochemistry (variable credit) | 1 - 22 |
| PH.550.600 | Living Science Ethics - Responsible Conduct of Research | 1 |
| **Credits** | | **1** |
| **Second Term** | | |
| PH.120.840 | Special Studies and Research Biochemistry (variable credit) | 1 - 22 |
| PH.120.820 | Thesis Research Biochemistry (variable credit) | 1 - 22 |
| PH.550.865 | Public Health Perspectives on Research | 2 |
| **Credits** | | **2** |
| **Third Term** | | |
| PH.120.840 | Special Studies and Research Biochemistry (variable credit) | 1 - 22 |
| PH.120.820 | Thesis Research Biochemistry (variable credit) | 1 - 22 |
| **Credits** | | **0** |
| **Fourth Term** | | |
| PH.120.840 | Special Studies and Research Biochemistry (variable credit) | 1 - 22 |
Laboratory Rotations

During their first year, students spend approximately one-half of their time conducting bench research during four laboratory rotations. Each rotation lasts eight weeks. The purpose of these rotations is to familiarize the student with research activities performed by faculty members in the program and to allow the student to make an informed decision in choosing a thesis adviser. Each rotation will be assigned by the Program Director, Dr. Michael Matunis, with input from the student, as follows:

- For the first rotation, students will receive a list during the summer of laboratories available for rotations. After receiving this list, students will provide the Program Academic Manager, with the names of three labs for possible rotation assignment. Assignments will be made by the Program Director in consultation with the Program Steering Committee.
- For the second through fourth rotations, students are required to meet with available faculty and discuss possible rotations during the two weeks prior to the end of their current rotation. Following these discussions, students will provide the Academic Office, with the names of three labs for possible rotation assignment. This list must be submitted one week prior to the end of the current rotation. Rotation assignments will be determined by the Program Director in consultation with the Program Steering Committee.
- Students are allowed to rotate only once in any given lab. Normally, the rotations will be distributed so there is only one rotation student per laboratory. This rule may be waived if there are unusual circumstances. To assist students in rotation choices, the department offers a one-credit course titled “Current Topics in BMB” held twice a week (12:00-1:00 PM) during the first term of the academic year, in which training faculty introduce students to their ongoing research.

Notes:

- Courses designated ME are offered by the School of Medicine and those designated PH are offered by the Bloomberg School of Public Health.
- Special Studies and Research/BMB = Monday Departmental Seminar Series
- Current Research Literature 4th term = Thesis proposal writing workshop
- Three (3) credits of a course in Epidemiology (PH.340.618 Epidemiology: the Basics – offered in 4th term)
- Six (6) credits of coursework outside BMB but within BSPH. Note: PH.500 series courses do not count toward this requirement.

Additional Requirements

Satisfactory Academic Progress and Laboratory Rotation Performance

- Students must receive a grade of B or better in each of the eight core (ME) courses listed in Table 1 and in Cancer Biology. Accumulation of two or more C’s or lower in these courses is grounds for dismissal from the program. If a student receives a C or lower grade in any of these nine courses, then the student must repeat the course and receive a B or better grade the second time.
- The School of Public Health requires Ph.D. candidates to achieve a final GPA of 3.0 or higher for graduation.
- Students must also receive satisfactory evaluations for each of the four laboratory rotations. Receiving two or more “poor” evaluations is grounds for dismissal from the program.
- Academic progress and laboratory rotation performances will be evaluated by the Program Steering Committee in early April, prior to the completion of the 4th rotation. Students who have met both academic and laboratory rotation standards will be notified and permitted to select a laboratory for thesis research. Students who have not met these standards may be dismissed from the program.

Selecting a Thesis Adviser

As a general policy, only one student may enter a given laboratory in any one year. Exceptions to this policy are made when circumstances warrant. Students are expected to meet with potential thesis lab advisers during the two weeks prior to the end of the fourth rotation and discuss the possibility of joining that lab for their thesis studies. Following these meetings, students will provide the Academic Program Manager, with the names of possible thesis advisers. Names must be submitted one week prior to the end of the fourth rotation. Students are required to meet and discuss thesis lab choices with the Program Director, Dr. Matunis, during the last week of the final rotation. Thesis lab placements will then be formalized between the student and adviser following this discussion. Every effort will be made to give students their first choice of thesis research lab.

Thesis Proposal/Oral Exam

Students must successfully pass one program examination (step 1, by October 15) and one oral practice examination (step 2, by November 15) before they are permitted to take the university Preliminary Oral Exam (step 3, by April 30) (see Table 2 (p. 4) for a summary of completion dates). The first of these steps, the program examination, is a two-part written/oral exam that must be based on the student’s doctoral thesis project. Students are asked to write a six-page research proposal that follows the format of a NIH F31 fellowship. This proposal shall be written with close guidance from the thesis adviser during the summer/early fall of the second year. The completed proposal will be submitted by the
first week of October of the second year to a committee consisting of
the student’s thesis adviser and two other JHU faculty members that
may be within or outside of BMB. The student must present the research
proposal and defend the rationale and experimental plan during an oral
exam that must take place before October 15th of the second year. The
committee will provide instructive feedback and recommended changes
for a revised written proposal that the student submits by November 15th.
Once the revised proposal is approved by the committee, the
student has passed the departmental written and oral exam requirement.
Full details of the examination process are provided in Appendix II
(p. 4). Additionally, detailed instructions on how to develop and
write the research proposal shall be disseminated as part of the Current
Research Literature class taken in the 4th quarter.

Preparation for Preliminary Oral Exam
Students are required to successfully pass a university administered
Preliminary Oral Exam (described below) to be officially accepted as
candidates for the Ph.D. degree. In preparation for this exam, students
are required to schedule an oral examination practice session within
4 months of completing their Thesis Proposal/Oral exam (by March
31). This practice session should be held no later than 1 month prior to
the Preliminary Oral Examination. The purpose of the practice session
is to help assess exam readiness. The student will select a committee
consisting of their Ph.D. thesis adviser and five peers. These five peers
should be pre-doctoral students who have already taken and passed
their oral exam, and/or postdoctoral students. No more than two of the
peers can be from the student’s own laboratory. Scientific diversity is
highly encouraged. The role of the adviser is to ensure that the practice
session emulates the official Preliminary Oral Examination mandated
by the university, and to provide feedback and guidance to the student
for the final stages of their preparation. A form (available from the BMB
academic office) attesting that the practice session has taken place
must be signed and dated by the members of the committee, including
the student’s adviser, and filed with the Academic Office. The student is
allowed to finalize the faculty panel and schedule the Preliminary Oral
Examination prior to the oral examination practice session. However, the
practice session must be completed before the official examination.

Preliminary Oral Examination
The Preliminary Oral Examination is a university-administered
examination that is designed to test the student’s breadth and depth of
knowledge in their area of study. Students must pass this examination
to officially become candidates for the Ph.D. degree. The examining
committee must:

1. consist of at least five voting members, no more than three of whom
   may be from the department sponsoring the candidate; the student’s
   thesis adviser will not be a member of the examining committee;
2. be comprised of duly appointed faculty members of Johns Hopkins
   University departments and must hold, at the time of selection, an
   appointment at the rank of Assistant Professor, Assistant Research
   Professor or Assistant Public Health Professor or higher;
3. be comprised of three departments of Johns Hopkins University, two
   being from the Bloomberg School of Public Health; and
4. include a faculty member outside of BMB who has a rank of
   Associate or Full Professor, Research Professor or Public Health
   Professor; there must be at least one member who has neither a
   primary nor joint appointment in BMB.

The Chair of the committee is appointed by the Senior Associate Dean
for Graduate Affairs. The senior faculty member outside of the student’s
department will normally serve as Chair and must hold the rank of
Associate or Full Professor. One adjunct faculty member or Scientist
track faculty member may serve on the Committee but may not serve
as Chair. Once a Ph.D. candidate’s Examination Committee has been
approved by the Office of Academic Affairs, substitution of Committee
members may not be made without prior approval of that office. Students
are encouraged to select their committee members and two alternates in
consultation with their thesis adviser. Forms must be completed at least
one month prior to the exam and submitted to the office of Academic
Affairs.

Students then meet with their committee to take the oral exam. During
the oral examination, each faculty member of the committee is given
an opportunity to ask questions designed to probe the student’s
understanding of the basic principles of biochemistry, molecular and
cellular biology and ability to conduct hypothesis driven research.
The examination has three possible outcomes: unconditional pass;
conditional pass; or failure. In cases of conditional pass, students may
be required to take additional coursework, or write an essay to remove
the condition. If the student fails the Preliminary Oral Examination and is
permitted a re-examination, the student must be re-examined within one
year. The Preliminary Oral Examination should be completed by April 30th
of the second academic year.

Thesis Advisory Committee
Upon successfully completing the Preliminary Oral Examination, a Thesis
Advisory Committee is formed to monitor the student’s progress on
their thesis research. The committee consists of at least three faculty
members (typically four) including the student’s thesis adviser. Members
of the committee may have primary appointments in BMB or in other
departments of the university. Students are encouraged to select
members of their committee in consultation with their thesis adviser.
In addition to regularly scheduled meetings with their Thesis Advisory
Committees, students are also encouraged to consult regularly with their
committee members for advice, as necessary.

Students are required to meet with their Thesis Advisory Committees at
least once each year, beginning from the time that they select a thesis lab
in April. Thesis committee meetings will be conducted using the following
format:

1. Students will designate one committee member as the chair – this
   should be the most senior BMB faculty member on the committee,
   excluding the thesis adviser. If the thesis adviser is the only BMB
   faculty member on the committee, the chair should be the most
   senior faculty member from outside of the department.
2. The student “Annual Thesis Committee Meeting Form” (Appendix III)
   will be completed and mailed to all committee members at least one
   day in advance of the meeting.
3. The meeting begins with the student stepping out of the room,
   allowing for a private discussion between committee members.
4. The meeting proceeds with the student presenting research progress
   and any other relevant information related to meeting individual
   development plans and progress toward graduation.
5. Following completion of the student presentation, the committee
   chair will lead a discussion that summarizes the committee’s
   views on student progress and recommendations for continued
   success and timely completion. Specific points in the committee’s
   “Annual Thesis Committee Meeting Form” (Appendix IV) will also be
discussed and the form will be completed by the chair and signed by
all committee members before the end of the meeting. The student
will retain a copy of the form and return a copy to the Program
Academic Manager.
6. The meeting concludes with the thesis adviser stepping out the room, allowing for a private discussion between the student and all other committee members.

**Individual Development Plans**

After joining a thesis research laboratory, all pre-doctoral trainees and their preceptors are required to participate in an Individual Development Plan (IDP) process on an annual basis. The form being used for this purpose is provided in Appendix V. As part of this process, trainees and their mentor discuss the following elements during a confidential, face-to-face meeting set up specifically for the IDP purpose:

1. career goals;
2. assessment of relevant skills, ranging from proficiency at the lab bench to knowledge of the literature, oral presentation, writing, leadership, collegiality, etc., as they relate to these goals;
3. list the achievements of the last year;
4. set specific goals relating to productivity, training, and professional development for the upcoming year; and
5. discuss time to graduation and preparation for post-graduation professional life. Completed IDP forms are to be sent to the IDP Program Director, Dr. Valeria Culotta.

**Thesis Preparation**

Once a target date for completion of the thesis project has been set by the Thesis Advisory Committee, the student should begin preparing to write their thesis. The thesis must consist of novel and publishable research findings, and may contain material that has already been published by the student during the course of the thesis project.

The thesis will be evaluated by a Thesis Committee composed of four readers that include the student’s thesis adviser. Two committee members must have a primary faculty appointment in a department other than BMB. The readers should have a rank of Assistant Professor or higher. A minimum of three departments of Johns Hopkins University, two from the School of Public Health, must be represented. Two readers must be primarily affiliated with BMB. At least one member must have neither a primary nor joint appointment in BMB. The committee may be increased to five members, provided that the above conditions are satisfied for four readers.

The committee and the required Final Oral Examination Form must be submitted to the BMB Academic Office at least one month prior to the date of the thesis defense. The thesis, accompanied by a letter from the student’s adviser signifying that the thesis is ready for distribution to the committee, should be submitted to the Thesis Committee at least two weeks prior to the thesis defense.

**Thesis Defense**

The thesis defense consists of a seminar in which the student presents some or all of the findings of their thesis project. This seminar, which is sponsored by BMB, is open to the public. Immediately after the seminar, the student will meet privately with the Thesis Committee. The Committee will ask questions about the thesis and will inform the student if the thesis is satisfactory. Following any necessary revisions, the student will submit the final thesis to the School of Public Health Registrar. Thesis fees are the responsibility of the student, unless their mentor agrees to pay them.

**Table 2. Summary of Program Milestones and Completion Dates**

<table>
<thead>
<tr>
<th>PhD Program Milestones</th>
<th>Completion Dates</th>
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<tbody>
<tr>
<td>Laboratory rotations (year one)</td>
<td>1st: September/October</td>
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<td></td>
<td>2nd: November/December</td>
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<td></td>
<td>3rd: January/February</td>
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<td></td>
<td>4th: March/April</td>
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<tr>
<td>Thesis lab selection (year one)</td>
<td>April 15</td>
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<tr>
<td>Thesis proposal / oral exam (year two)</td>
<td>Oral defense: October 15</td>
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<tr>
<td>Departmental practice POE (year two)</td>
<td>Revised proposal: November 15</td>
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<tr>
<td>University POE (year two)</td>
<td>Before March 31</td>
</tr>
<tr>
<td>Thesis Advisory Committee Meetings (years three to completion)</td>
<td>Annual</td>
</tr>
<tr>
<td>Individual Development Plans (year two to completion)</td>
<td>Annual</td>
</tr>
<tr>
<td>Thesis defense</td>
<td>To be determined / Maximum of 7 years</td>
</tr>
</tbody>
</table>

**Laboratory Notebooks**

While different laboratories may use different kinds of physical (or online) notebooks, all share certain fundamentals. A proper laboratory notebook is an accurate, contemporaneous, permanent, and legible record of the student’s deeds and thoughts regarding their research project. This notebook is the property of the laboratory and should not leave the laboratory, though students are free to make and take copies. The student’s notebook will be consulted by others to establish what the student did, and to find out how they did it, often long after the student has gone. So, if a student has not developed good record-keeping habits, this is an excellent time to begin. Consult the faculty preceptors for guidance and please refer to the Bloomberg School of Public Health Student Handbook (publichealth.jhu.edu/offices-and-services/office-of-student-affairs) for Policy and Procedures on the subject of Academic Ethics.

**Appendix II**

**Thesis Research Proposal / Oral Exam**

In completion of the departmental written and oral exam requirements

All students that matriculated as of fall 2014 must prepare a research proposal that meets the requirements of the “Research Training Plan” section of an NIH F31 grant application. Specific guidelines for preparing this proposal, as detailed in the F31 grant application guide, are attached below. Other specifics and a timeline for completing the proposal and oral exam are as follows:

**May – September, Year 1:** Student works full-time in their chosen thesis lab to generate the preliminary data and ideas for developing a research proposal. The mentor must work closely with the student in defining the research project to pursue. The student and mentor choose a committee of two additional faculty that will act as additional consultants for the student, reviewers of the written proposal and serve as members of an oral examination committee. These faculty members may come from
within the BMB department or from outside the department should they provide special expertise in the research area and in writing fellowships. Over the summer the student should schedule the oral exam component of the proposal that should occur within the first two weeks of October (see below).

**September – October, Year 2:** The student writes the first draft of the proposal. The mentor is expected to play an active role in proposal development and coaching the student to write in a clear, concise, study section-friendly manner. The adviser should not write the proposal but provide guidance and feedback through several drafts. Consultation with other committee members is also encouraged.

**October 1st-15th, Year 2:** The student submits their proposal to the committee at least one week in advance of the oral exam which must be scheduled no later than October 15th. For this oral exam, the student presents in a chalk talk format, the rationale and experimental sections of the research plan. The committee will test the student's ability to defend the proposed experiments – is the rationale sufficiently compelling to support the experiments proposed? The committee will also provide guidance as how to re-structure the proposal as needed and improve the research plan.

**October 15th – November 15th, Year 2:** The student prepares a revised version of the proposal that addresses concerns and incorporates suggestions by the committee. The adviser should work closely with the student in assembling this revised application. The revised application must be submitted to the committee no later than November 15th for review. Following approval of this revised application, and satisfactorily completing the oral exam component, the student has officially passed the departmental written and oral exam requirement.

**Additional comments:** This exercise is designed to help students prepare quality research proposals that can be submitted as fellowship applications for funding considerations. It is expected that a majority (but not all) students will choose to submit their proposals to the NIH and the exam requirement will be completed in time for the December 8th F31 deadline. Other students may choose alternative funding sources, and the exam requirement will be completed in time for the December 8th F31 deadline. For this oral exam, the student presents in a chalk talk format, the rationale and experimental sections of the research plan. The committee will test the student's ability to defend the proposed experiments – is the rationale sufficiently compelling to support the experiments proposed? The committee will also provide guidance as how to re-structure the proposal as needed and improve the research plan.

**Guidelines for Preparing the Proposal (Verbiage Taken Directly from NIH Guidelines)**

The Research Training Plan should include sufficient information needed for evaluation of the project, independent of any other document (e.g., previous application). Be specific and informative, and avoid redundancies. This section should be well-formulated and presented in sufficient detail that it can be evaluated for both its research training potential and scientific merit. It is important that it be developed in collaboration with your sponsor, but it should be written by you, the fellowship applicant.

**The following page limits apply** (All page limits include all tables, graphs, figures, diagrams and charts).

- Specific Aims – limited to one page.
- Research Strategy – limited to six pages (does not include the Bibliography and References Cited section).

Be succinct and remember that there is no requirement to use all six pages allotted to the Research Strategy. Note that the Research Training Plan may include graphic images of gels, micrographs, photographs, etc.; however these images may not be included in an Appendix.

**Note:** Begin each text section of the Research Training Plan with a section header (e.g., Specific Aims, Research Strategy).

**Specific Aims are limited to one page.**

State concisely the goals of the proposed research and summarize the expected outcome(s), including the impact that the results of the proposed research will exert on the research field(s) involved. List succinctly the specific objectives of the research proposed, e.g., to test a stated hypothesis, create a novel design, solve a specific problem, challenge an existing paradigm or clinical practice, address a critical barrier to progress in the field, or develop new technology.

**Research Strategy is limited to six pages.**

Organize the Research Strategy in the specified order using the instructions provided below. Start each section with the appropriate section heading — Significance, Innovation, Approach. Cite published experimental details in the Research Strategy section and provide the full reference in the Bibliography and References Cited section (there is not page limit to the Bibliography and References Cited section).

**Significance**

- Explain the importance of the problem or critical barrier to progress in the field that the proposed project addresses.
- Explain how the proposed project will improve scientific knowledge, technical capability, and/or clinical practice in one or more broad fields.
- Describe how the concepts, methods, technologies, treatments, services, or preventative interventions that drive this field will be changed if the proposed aims are achieved.

**Innovation**

Fellowship applications should not include an Innovation section unless specified in the FOA.

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### Appendix VI

#### Timeline Summary

<table>
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<tr>
<th>Time</th>
<th>Description</th>
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<tr>
<td>May – September, yr 1</td>
<td>Define specific aims of the proposal, identify two committee members, generate preliminary data</td>
</tr>
<tr>
<td>September – October, yr 2</td>
<td>Prepare first written draft of the proposal</td>
</tr>
<tr>
<td>October 1st-15th, yr 2</td>
<td>Submit the proposal to examining committee, schedule and complete oral exam</td>
</tr>
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</table>
Approach

- Describe the overall strategy, methodology, and analyses to be used to accomplish the specific aims of the project. Unless addressed separately in Item 14 (Resource Sharing Plan), include how the data will be collected, analyzed, and interpreted as well as any resource sharing plans as appropriate.
- Discuss potential problems, alternative strategies, and benchmarks for success anticipated to achieve the aims.
- If the project is in the early stages of development, describe any strategy to establish feasibility, and address the management of any high risk aspects of the proposed work.
- Point out any procedures, situations, or materials that may be hazardous to personnel and precautions to be exercised. A full discussion on the use of select agents should appear in Item 15, below.
- If research on Human Embryonic Stem Cells (hESCs) is proposed but an approved cell line from the NIH hESC Registry cannot be identified, provide a strong justification for why an appropriate cell line cannot be chosen from the Registry at this time.

If an applicant has multiple Specific Aims, then the applicant may address Significance, Innovation and Approach for each Specific Aim individually, or may address Significance, Innovation and Approach for all of the Specific Aims collectively.

As applicable, also include the following information as part of the Research Strategy, keeping within the three sections listed above: Significance, Innovation, and Approach.

Preliminary Studies for New Applications.

For new applications, include information on preliminary studies, if any. Discuss the applicant’s preliminary studies, data and/or experience pertinent to this application. When applicable, provide a succinct account of published and unpublished results, indicating progress toward their achievement.

Course Requirement Specific to the NCI-funded Training Grant

Cancer Training Grant: Training in Areas Fundamental to Cancer Research

- Fundamentals of Cancer (ME.510.706 Fundamentals of Cancer: Cause to Cure – 1st and 2nd terms)

See Program Academic Coordinator regarding course availability or alternatives

RESPONSIBLE CONDUCT OF RESEARCH

All research students must complete courses in the responsible conduct of research before graduation. Currently, the online course PH.550.860 Academic & Research Ethics at BSPH must be completed by all students during the first term of matriculation. Students must also take the course PH.550.600 Living Science Ethics - Responsible Conduct of Research, in the 1st term of their second year. Students should refer to the Bloomberg School of Public Health Student Handbook (publichealth.jhu.edu/offices-and-services/office-of-student-affairs) for Policy and Procedures on the subject of Academic Ethics.

Satisfactory Academic Progress and Laboratory Rotation Performance

1) Students must receive a grade of B or better in each of the eight core (ME) courses listed in Table 1 and in Cancer Biology. Accumulation of two or more C’s or lower in these courses is grounds for dismissal from the program. If a student receives a C or lower grade in any of these nine courses, they must repeat the course and receive a B or better grade the second time.

2) The School of Public Health requires Ph.D. candidates to achieve a final GPA of 3.0 or higher for graduation.

3) Students must also receive satisfactory evaluations for each of the four laboratory rotations. Receiving two or more “poor” evaluations is grounds for dismissal from the program. Academic progress and laboratory rotation performances will be evaluated by the Program Steering Committee in early April, prior to the completion of the 4th rotation. Students who have met both academic and laboratory rotation standards will be notified and permitted to select a laboratory for thesis research. Students who have not met these standards may be dismissed from the program.

The goals of the Department of Biochemistry and Molecular Biology (BMB) are to increase current knowledge of the biochemical and molecular basis of normal and abnormal cellular processes relevant to public health and medicine, and to train highly qualified scientists who, through research, teaching, and service will continue to provide new insights into the biochemical, molecular, and biophysical underpinnings of biomedical issues that have an impact on the health of the public.

Research activities in BMB span a broad range of topics including DNA replication and repair pathways (genome integrity), cellular stress responses, reproductive biology, stem cells, cell differentiation, aging, cancer, and chronic diseases. The department is also home to a structural biology technological platform with ongoing efforts focusing on cell signaling and genome engineering and integrity.