STUDENT HANDBOOK

for the

Biomedical Sciences Graduate Program

Penn State College of Medicine

July 2011
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I. Introduction

Welcome to the Biomedical Sciences (BMS) Graduate Program with Options in Biochemistry and Molecular Genetics (BMG), Translational Therapeutics (TT), and Virology and Immunology (VIRIM) at the Penn State College of Medicine. The integrated nature of the Program and Options permits students to choose their dissertation adviser and committee members from the approximately 150 faculty members of the Program who represent more than 20 basic science and clinical departments. Research interests of Program faculty members are wide-ranging in both scientific disciplines and specific research interests. Graduate students benefit from the opportunity to tailor both their coursework and research to align closely with their particular interests.

This Student Handbook has been compiled as an aid and resource for graduate students and faculty in the Program. It contains current information and degree requirements for the Program. Additional University requirements can be found in The Pennsylvania State University Bulletin of Graduate Degree Programs (www.psu.edu/bulletins/whitebook) and the Thesis Guide (available at http://www.gradsch.psu.edu/current/thesis.html).

A. Objective of BMS Graduate Program

The objective of the BMS Graduate Program is to train individuals for advanced professional careers in the biomedical sciences and related fields. The Program is directed toward students who plan to pursue the Doctor of Philosophy (Ph.D.) degree. Successful completion of the Program implies that the student has (1) achieved a satisfactory knowledge in biomedical sciences and related areas; (2) demonstrated accomplishment in research; (3) consistently demonstrated high standards of scholarship and academic integrity; (4) demonstrated the ability to read and critically evaluate scientific literature; and (5) demonstrated effective scientific communication in written and oral presentations. Upon successful completion of the degree program, the individual should have the competence to engage in independent research and education in the biomedical sciences or related fields.

B. Degree Programs

The BMS Graduate Program and its Options confer the Ph.D. degree and, in special situations, the Master of Science (M.S.) degree. However, students are generally not admitted to the Program to pursue the M.S. degree. The objective for students enrolled in the Ph.D. degree program is to demonstrate excellence in research, scholarship, and scientific experimentation in biomedical sciences. The M.S. degree is strongly research oriented and is designed to develop research competence.
C. Responsibilities of the Student, Dissertation Adviser, and Committee

Each student is responsible for ensuring that the Graduate School and BMS Graduate Program requirements for his/her degree program are met at appropriate times.

Students, dissertation advisers, and committees are responsible to fulfill appropriate deadlines for meetings and examinations required by the Graduate School and the BMS Graduate Program. Specific functions for Ph.D. committee are described in sections III. C.

On an annual basis, the BMS support staff will provide the ‘Graduate Student Progress – Annual Review Form’ (form in Appendix A) to the student and Dissertation Adviser to be reviewed, updated, signed, and returned to the BMS Program Office.

II. Laboratory Rotations and Selection of Dissertation Adviser

A. Selecting Laboratory Rotations

A key decision during the first year is selecting a dissertation adviser and the laboratory in which to conduct dissertation research. The BMS Graduate Program Advisory Committee provides advice and oversight during this process. A number of opportunities during the first year provide information to assist in making this choice.

1. Research interest presentations occur during orientation. As a follow-up to these presentations, appointments should be scheduled to talk in more detail with faculty about research areas of particular interest.

2. Laboratory rotations during the first year provide an opportunity to spend time with faculty members of particular interest to learn more about their research program and laboratory environment. These rotations also provide opportunities to design and conduct experiments, collect and analyze data, and present results in written and oral reports. These are all critical skills required for success in a scientific career. Students do at least four rotations to sample the breadth of research opportunities. Rotation periods for the 2011-12 academic year are: 1) September 6 to October 24; 2) October 25 to December 13; 3) January 9 to February 26; and 4) February 27 to April 27. Adjustments to the beginning and ending dates of rotations can be made if appropriate for completion of experiments. Such adjustments should be discussed as soon as they become apparent with any faculty members affected by the change as well as with the Chair of the BMS Graduate Program.

B. Rotation Reports

A written report is required for each rotation. This 2- to 3-page, single-spaced report on the research conducted during the rotation is written solely by the student and submitted to the rotation adviser and the Chair of the BMS Graduate Program within one week after completion of each rotation. The reports are evaluated by the rotation adviser and another member of the BMS Graduate Faculty.

The report includes:

1. the background of the project,
2. the goal(s) of the experiments that were conducted,
3. the experimental design/strategy that was followed, 
4. the predicted outcome(s), 
5. the actual results that were obtained, and 
6. a discussion of the results.

Previous studies that are central to the project should be referenced and the report should include a bibliography at the end (not counted in the page requirements). The inclusion of appropriate figures is encouraged; however, these figures are placed in an appendix and do not contribute to the page requirements. It is often the case that research projects encounter problems. If this is the case during the rotation, the student should describe the nature of the problem(s), the actions taken to overcome the problem(s), and what should be done next.

Each student also give an oral presentation on one of his/her first three rotations during the week after spring break (in Spring 2012 this is the week of March 12-16). Presentations are approximately 15 minutes in length and provide the background, approach(es), outcome(s), and discussion of the results for the chosen research rotation. The oral presentation is evaluated by members of the BMS Graduate Program Advisory Committee.

The written and oral reports provide an opportunity to evaluate (1) the progress of each student in understanding experimental design, conducting experiments, and critically analyzing results and (2) the written and oral presentation skills of each student. In part, these reports also assess whether the English Competence requirement of the Graduate School has been fulfilled. Other mechanisms for evaluating English Competence are provided by the various oral presentations and written answers to essay questions that students provide during their graduate study. Proficiency in English must be demonstrated prior to administration of the comprehensive exam.

**C. Choosing a Dissertation Adviser**

Selection of a dissertation adviser is based on a) student interest in the research program, b) consent of the faculty member, and c) available funding to support the student in the lab of interest, which includes written approval from the intended adviser’s departmental Chair. Typically this decision is finalized after completion of the candidacy exam.

A student who at any time becomes concerned that his/her choice of dissertation adviser may not have been appropriate, needs to discuss the situation with the Director of their Program or Option and their dissertation adviser as soon as possible. If the student ultimately decides s/he would like to try to identify a new dissertation adviser, the student will provide at least four-weeks written notice to his/her Director and current dissertation adviser. During this time, the student must identify a new adviser willing to accept him/her into the laboratory and assume financial responsibility for the student (see above) at the end of his/her time in the current laboratory. The current dissertation adviser retains all laboratory notebooks, reagents (antibodies, cell lines, etc.), experimental protocols, and other research materials.

**D. Student Responsibilities in Choosing Advisers**

Identification of advisers for rotations and the final choice of a dissertation adviser and committee members are the responsibility of the student. Failure to choose a dissertation adviser by the end of the Fall semester of the student’s second year can be considered lack of academic
progress. Failure to develop an extended professional relationship with a dissertation adviser that permits development of the scholarship and rigor necessary to obtain a Ph.D. in the biomedical sciences can be considered unsatisfactory scholarship. Lack of academic progress or unsatisfactory scholarship could result in termination from the graduate degree program.

III. Requirements for the Doctor of Philosophy (Ph.D.) Degree

To advance to full-time research, each student must: (A) complete the appropriate curricular track maintaining at least a 3.00 grade-point average (GPA); (B) pass the candidacy exam typically at the end of year one; (C) constitute his/her Doctoral Committee; (D) demonstrate high-level competence in the use of the English language in reading, writing, and speaking prior to scheduling the comprehensive exam; (E) pass the comprehensive exam typically prior to the beginning of year three; (F) conduct dissertation research; and (G) prepare a dissertation and defend it in the final oral examination.

At the end of this section, a checklist is provided for following progress toward the degree.

A. Curriculum

1. Choice of Curricular Track

By the end of the first year, each student chooses among four curricular tracks that focus coursework on different disciplines. These four tracks are the Biomedical Sciences (BMS) track, the Biochemistry and Molecular Genetics (BMG) track, the Translational Therapeutics (TT) track, and the Virology and Immunology (VIRIM) track. These tracks align with the BMS Program and the three Options in the Program, respectively.

2. Registration

Each student is responsible for proper registration each semester via eLion. Prior to completion of the comprehensive exam, a student must be registered for at least 9 credits each semester (excluding the summer semester) to maintain full-time student status. In situations where the total number of credits derived from formal coursework does not equal 9, additional required credits are secured by registering for an appropriate number of credits of Individual Studies (BMS 596) prior to passing the candidacy examination or Thesis Research (BMS 600) after passing the candidacy exam. It is important to note that students with a half-time assistantship may register for no more than 12 credits. Therefore, there may be circumstances where a student may be engaged in laboratory rotations or dissertation research but may not, due to the 12-credit maximum, register for Individual Studies or Thesis Research.

All formal coursework is generally completed prior to the scheduling of the comprehensive examination. After completion of the comprehensive exam, students register for Thesis Preparation (601) for 0 credits. A student remains eligible to take courses following successful completion of this exam, although this eligibility may have limitations. Each student should consult with his/her Dissertation Adviser and/or the appropriate Director for details and limitations.
3. **Coursework and Scholarship and Research Integrity**

Table 1 lists the required courses for the four curricular tracks during the first two years of the program with the typical time for taking each course. Elective courses in the first year are chosen in consultation with the Program Chair or appropriate Director. Electives in the second year are chosen in consultation with the Dissertation Adviser and/or Doctoral Committee.

In 2009, The Graduate School instituted a new requirement for training in Scholarship and Research Integrity (SARI), which for BMS students includes two components:

* Completion of the CITI module ‘Responsible Conduct of Research’ (completed independently online prior to June 30th of year one; [https://www.citiprogram.org/default.asp](https://www.citiprogram.org/default.asp))

* Pass the course BMS 591 – Ethics in the Life Sciences

More information can be found at [http://www.pennstatehershey.org/web/gsa/home/integrity](http://www.pennstatehershey.org/web/gsa/home/integrity).

4. **Curricular Requirements**

The Doctor of Philosophy degree in Biomedical Sciences with any appropriate Option is conferred on a student in recognition of high attainment and productive scholarship in biomedical sciences. In addition to the course requirements provided above, the student must achieve:

- a minimum GPA of 3.00 to advance to candidacy, qualify for the comprehensive examination, and graduate. Grades for BMS 504 and 505, Colloquium (590), Individual Studies (596), and Thesis Research (600) are not counted in calculating this GPA for the BMS Graduate Program;

- a minimum of 30 graduate credits (33 for the VIRIM Option), of which 20 must be from Penn State, and up to 10 credits of graduate work may be transferred from another institution. Prior to submitting the credit transfer request to the Office of Graduate Enrollment Services for final approval, the BMS Advisory Committee must approve the request; and

- at least 18 credits at the 500-600 level.

A student who fails to make acceptable progress in a degree program will be dropped from the program. One or more failing grades or a cumulative GPA below 3.00, calculated based on the BMS Program policy on GPA described above, for any semester or session or combination of semesters and/or sessions may be considered evidence of failure to maintain satisfactory scholarship. A GPA below 3.00 automatically places a student on academic probation and the student must meet with the Program Chair or the appropriate Director to determine the course of action required to address this situation and avoid dismissal from the Program. A student receiving grades of C or below in two of the three core courses during the first semester (BMS 501, 502, and 503) may be dismissed from the Program. The Program Advisory Committee may initiate action as described in Appendix III of the Graduate School Bulletin ([http://bulletins.psu.edu/bulletins/whitebook/appendices.cfm?section=appendix3](http://bulletins.psu.edu/bulletins/whitebook/appendices.cfm?section=appendix3)).
### Table 1: Typical Coursework Schedule for the Four Curricular Tracks: Years 1 and 2

<table>
<thead>
<tr>
<th>CORE REQUIREMENTS FOR ALL STUDENTS</th>
<th>13 Core Requirement Credits</th>
<th>13 Program Required Credits</th>
<th>7 Elective Credits</th>
<th>BMS PROGRAM TRACK</th>
<th>BMG OPTION TRACK</th>
<th>TT OPTION TRACK</th>
<th>VIRIM OPTION TRACK</th>
</tr>
</thead>
<tbody>
<tr>
<td>13 Core Requirement Credits</td>
<td>13 Core Requirement Credits</td>
<td>10 Program Required Credits</td>
<td>10 BMG Option Required Credits</td>
<td>7 Elective Credits</td>
<td>7 Elective Credits</td>
<td>10 TT Option Required Credits</td>
<td>20 VIRIM Option Required Credits</td>
</tr>
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<td>7 Elective Credits</td>
<td>10 TT Option Required Credits</td>
<td>20 VIRIM Option Required Credits</td>
</tr>
</tbody>
</table>

### Fall Year 1 (11 credits)
- **BMS PROGRAM TRACK**
  - Core Requirement (3) BMS 501 Regulation of Cellular & Systemic Energy Metabolism (3)
  - Core Requirement (3) BMS 502 Cell & Systems Biology (3)
  - Core Requirement (3) BMS 503 Flow of Cellular Information (3)
  - Core Requirement (1) BMS 504 Art of Scientific Communication I (1)
  - Core Requirement (1) BMS 596 Individual Studies: Research Rotation (1)
- **BMG OPTION TRACK**
  - Core Requirement (3) BMS 501 Regulation of Cellular & Systemic Energy Metabolism (3)
  - Core Requirement (3) BMS 502 Cell & Systems Biology (3)
  - Core Requirement (3) BMS 503 Flow of Cellular Information (3)
  - Core Requirement (1) BMS 504 Art of Scientific Communication I (1)
  - Core Requirement (1) BMS 596 Individual Studies: Research Rotation (1)
- **TT OPTION TRACK**
  - Core Requirement (3) BMS 501 Regulation of Cellular & Systemic Energy Metabolism (3)
  - Core Requirement (3) BMS 502 Cell & Systems Biology (3)
  - Core Requirement (3) BMS 503 Flow of Cellular Information (3)
  - Core Requirement (1) BMS 504 Art of Scientific Communication I (1)
  - Core Requirement (1) BMS 596 Individual Studies: Research Rotation (1)
- **VIRIM OPTION TRACK**
  - Core Requirement (3) BMS 501 Regulation of Cellular & Systemic Energy Metabolism (3)
  - Core Requirement (3) BMS 502 Cell & Systems Biology (3)
  - Core Requirement (3) BMS 503 Flow of Cellular Information (3)
  - Core Requirement (1) BMS 504 Art of Scientific Communication I (1)
  - Core Requirement (1) BMS 596 Individual Studies: Research Rotation (1)

### Spring Year 1 (6 to 9 credits)
- **BMS PROGRAM TRACK**
  - Option Specific BMS 505 Art of Scientific Communication II (1)
  - Option Specific BMS 596 Individual Studies: Research Rotation (2)
  - Option Specific BMS 520 Integrative Physiology (3)
  - Option Specific (PROGRAM ELECTIVE) BMS 505 Art of Scientific Communication II (1)
  - Option Specific BCHEM 596 Individual Studies; Research Rotation (2)
  - Option Specific BCHEM 521 Structure, Function, & Regulation of Biological Molecules (3)
  - Option Specific (PROGRAM ELECTIVE) BCHEM 522 Molecular Genetics: Genes to Genomes (3)
  - Option Specific BMS 591 Ethics (1)
  - Option Specific BCHEM 590 Colloquium (1)
  - Option Specific PHARM 520 Principles of Drug Action (2)
  - Option Specific PHARM 551 Anticancer Therapeutics (1)
  - Option Specific MICRO 581 Principles of Immunology A (1)
- **BMG OPTION TRACK**
  - Option Specific BMS 505 Art of Scientific Communication II (1)
  - Option Specific BCHEM 596 Individual Studies; Research Rotation (2)
  - Option Specific BCHEM 521 Structure, Function, & Regulation of Biological Molecules (3)
  - Option Specific (PROGRAM ELECTIVE) BCHEM 522 Molecular Genetics: Genes to Genomes (3)
  - Option Specific BMS 591 Ethics (1)
  - Option Specific BCHEM 590 Colloquium (1)
  - Option Specific PHARM 520 Principles of Drug Action (2)
  - Option Specific PHARM 551 Anticancer Therapeutics (1)
  - Option Specific MICRO 581 Principles of Immunology A (1)
- **TT OPTION TRACK**
  - Option Specific BMS 505 Art of Scientific Communication II (1)
  - Option Specific BCHEM 596 Individual Studies; Research Rotation (2)
  - Option Specific BCHEM 521 Structure, Function, & Regulation of Biological Molecules (3)
  - Option Specific (PROGRAM ELECTIVE) BCHEM 522 Molecular Genetics: Genes to Genomes (3)
  - Option Specific BMS 591 Ethics (1)
  - Option Specific BCHEM 590 Colloquium (1)
  - Option Specific PHARM 520 Principles of Drug Action (2)
  - Option Specific PHARM 551 Anticancer Therapeutics (1)
  - Option Specific MICRO 581 Principles of Immunology A (1)
- **VIRIM OPTION TRACK**
  - Option Specific BMS 505 Art of Scientific Communication II (1)
  - Option Specific BCHEM 596 Individual Studies; Research Rotation (2)
  - Option Specific BCHEM 521 Structure, Function, & Regulation of Biological Molecules (3)
  - Option Specific (PROGRAM ELECTIVE) BCHEM 522 Molecular Genetics: Genes to Genomes (3)
  - Option Specific BMS 591 Ethics (1)
  - Option Specific BCHEM 590 Colloquium (1)
  - Option Specific PHARM 520 Principles of Drug Action (2)
  - Option Specific PHARM 551 Anticancer Therapeutics (1)
  - Option Specific MICRO 581 Principles of Immunology A (1)

### Decision regarding Program or Option; BMS Graduate Program Candidacy Examination - Enter laboratory for dissertation research

### Fall Year 2 (2 to 8 credits)
- **BMS PROGRAM TRACK**
  - Core Requirement (1) BMS 591 Ethics (1)
  - Option Specific BMS 590 Colloquium (1)
  - Option Specific (PROGRAM ELECTIVE) PHARM 552 Integrated Systems Pharmacology (1)
- **BMG OPTION TRACK**
  - Core Requirement (1) BMS 591 Ethics (1)
  - Option Specific BCHEM 590 Colloquium (1)
  - Option Specific (PROGRAM ELECTIVE) PHARM 552 Integrated Systems Pharmacology (1)
- **TT OPTION TRACK**
  - Core Requirement (1) BMS 591 Ethics (1)
  - Option Specific PHARM 520 Principles of Drug Action (2)
  - Option Specific PHARM 554 Anticancer Therapeutics (1)
- **VIRIM OPTION TRACK**
  - Core Requirement (1) BMS 591 Ethics (1)
  - Option Specific (PROGRAM ELECTIVE) PHARM 552 Integrated Systems Pharmacology (1)

### Spring Year 2 (2 to 8 credits)
- **BMS PROGRAM TRACK**
  - Option Specific BMS 590 Colloquium (1)
  - Option Specific BCHEM 590 Colloquium (1)
  - Option Specific (PROGRAM ELECTIVE) PHARM 561 Neuropharmacology (2)
  - Option Specific MICRO 560 Concepts in Immunology (4)
- **BMG OPTION TRACK**
  - Option Specific BCHEM 590 Colloquium (1)
  - Option Specific BCHEM 590 Colloquium (1)
  - Option Specific (PROGRAM ELECTIVE) PHARM 562 Endocrine Pharmacology (2)
  - Option Specific MICRO 583 Viral Vectors (1)
- **TT OPTION TRACK**
  - Option Specific (PROGRAM ELECTIVE) PHARM 561 Neuropharmacology (2)
  - Option Specific MICRO 560 Concepts in Immunology (4)
  - Option Specific MICRO 583 Viral Vectors (1)
- **VIRIM OPTION TRACK**
  - Option Specific (PROGRAM ELECTIVE) PHARM 561 Neuropharmacology (2)
  - Option Specific MICRO 560 Concepts in Immunology (4)
  - Option Specific MICRO 583 Viral Vectors (1)

### Comprehensive Exam

<table>
<thead>
<tr>
<th>Option Specific</th>
<th>BMS 590 Colloquium (1)</th>
<th>BCHEM 590 Colloquium (1)</th>
<th>PHARM 561 Neuropharmacology (2)</th>
<th>MICRO 560 Concepts in Immunology (4)</th>
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<tr>
<td>Option Specific</td>
<td>BCHEM 590 Colloquium (1)</td>
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</tbody>
</table>

1. The minimum number of elective credits required is shown. In consultation with their Dissertation Adviser, students may take additional credits. One potential timing of elective credits for each track is indicated by “PROGRAM ELECTIVE”. For a complete list of potential elective courses, see [http://med.psu.edu/web/biomedical-sciences/program-courses](http://med.psu.edu/web/biomedical-sciences/program-courses)

Numbers in parentheses indicate credit hours for each course.
5. Seminar and Journal Club Presentations and Attendance

Students in the Program are required to attend seminars given in the BMS Student Seminar Series. Beginning in the second year, each student will present a seminar in this series on an annual basis. Students may also be required to give seminars in other series such as the seminar series in the department of their adviser.

Students are also required to attend presentations given by invited speakers in the BMS Program Seminar Series. Attendance at other relevant seminars is highly recommended and may be required by the thesis adviser or the department of the adviser. These seminars are excellent opportunities to enhance knowledge of associated fields.

Students are also required to participate annually in a journal club.

B. Candidacy Exam

1. Purpose of the candidacy exam

The candidacy exam serves to assess the student’s mastery of the basic body of knowledge and development of the breadth and depth of scholarship that is expected of Ph.D. candidates. The formal purpose for the exam is to determine whether the student has earned admission to candidacy, and can hence begin a period of research aimed toward a Ph.D. dissertation. This exam provides the Candidacy Exam Committee and the student with a gauge of the capabilities of the student. It can also point out deficiencies that can be corrected by course work or independent study. Finally, the candidacy serves as another mechanism for evaluating the student's communication skills.

2. When does a student take the candidacy exam?

The University regulation is that a student cannot take the candidacy exam before completion of 18 credits after the Baccalaureate. The University also requires that the exam be taken within three semesters after admission to the Program (excluding summers). Hence, a student admitted in the Fall of one calendar year must take the exam by the end of the Fall semester of the next calendar year. Typically, the candidacy is usually administered after the first year of coursework is completed. All students are required to have a minimum GPA of 3.00 as defined by the Program at the time the candidacy is taken.

3. Who administers the candidacy exam?

The BMS Advisory Committee will choose members of the BMS Graduate Faculty to write questions and administer the oral component of the exam.

4. Format of the candidacy exam

The student should be prepared to answer questions related to those aspects of biomedical sciences encountered in their first-year curriculum. The candidacy exam has a written and an oral component.

The written component will have up to twelve questions. This portion of the exam is closed book and will take place on two consecutive days. The answers will be evaluated in terms of the student’s breadth and depth of knowledge and on competence in English. In general, students will be required to answer two questions related to material covered in each of the core courses taken in the Fall semester of the first year (BMS 501, 502, and 503) as well as one or two
questions from each course taken in the Spring semester of the first year. Students taking the exam at other times may have questions related to material covered in other courses they have taken. Students should be aware that while the questions are related to material covered in the course, answers to questions may require application of material students should have acquired from other resources (e.g., undergraduate education, seminars, laboratory rotations).

The oral component of the exam will follow within two weeks of the written exam. This portion of the exam provides an opportunity to determine whether or not incorrect responses on the written component indicate serious deficiencies as well as to probe the breadth and depth of scholarship of the student in other areas.

5. Grading of the candidacy exam
The response to each written question is graded on a 0 to 10 scale. These grades are averaged to determine the overall performance on the written portion.

Following the oral portion of the exam, each member of the committee will assign a grade on 0 to 10 scale. These grades are averaged to determine the overall performance on the oral portion. The average of the overall performances on the written and oral portions must be at least seven to pass.

6. Approval of the candidacy exam results

After the student passes the candidacy exam, the Chair of the BMS Graduate Program completes the proper forms and sends the form to the Office of Graduate Enrollment Services. The Chair will also provide a written statement attesting to the student's English competence or recommendations for additional studies.

7. What happens if a student fails the candidacy exam?
A student who fails the candidacy exam may be given the opportunity to retake it at a future date or may be required to withdraw from the Ph.D. program depending on their level of performance on the exam and in other aspects of the Ph.D. program. The decision of whether to permit a second exam and to determine the appropriate time for its administration is at the discretion of the BMS Advisory Committee. If permitted to retake the exam, the student may proceed with laboratory rotations and/or selection of a dissertation adviser and establishment of a Doctoral Committee. However, the Doctoral Committee cannot be officially formed until the candidacy exam is successfully completed. A student who fails a second candidacy exam will be required to withdraw from the Ph.D. program.

C. Doctoral Committee

1. Members

The student should confer with his/her Dissertation Adviser when considering members to suggest for their Doctoral Committee. This committee consists of four or more active members of the Graduate Faculty. The Advisory Committee recommends that five members be appointed to the Doctoral Committee, particularly in those situations where two members of the committee are from the same research group. The Dissertation Adviser must be a member of the Doctoral Committee and usually serves as chair. At least one member of the committee must be an “Outside Field Member”. The Outside Field Member must represent a field outside the candidate’s major field of study to provide a broader range of disciplinary perspectives and expertise. This member may be from a different department than the Dissertation Adviser or
from a Program or Option different than that of the student. The Outside Field Member shall not hold an appointment having a budgetary connection to either the other committee members or their departments. Examples of conflicts of interest that would disqualify someone as the Outside Field Member include serving as co-principal investigator on grants or other funding sources with any other members of the Doctoral Committee.

The Dissertation Adviser submits the suggested names of members for the Doctoral Committee to the BMS Advisory Committee. All Doctoral Committees must be approved by the BMS Advisory Committee and reviewed periodically to ensure its members continue to qualify for service in their designated roles.

The Doctoral Committee should meet at least once a year. Required paperwork from this meeting (see Appendix A Graduate Student Progress – Annual Review Form) must be filed with the BMS Program Office.

2. Responsibilities of the Doctoral Committee

The Doctoral Committee is responsible for approving the broad outline of the student’s program and should review the program as soon as possible after the student’s admission to candidacy. Continuing communication among the student, the Dissertation Adviser, and members of the committee is strongly recommended to preclude misunderstandings and to develop a collegial relation between the candidate and the committee.

D. English Competency

All Ph.D. candidates are required to demonstrate high-level competence in the use of the English language, including reading, writing, and speaking. The Graduate School requires the Program to formally attest to a student's English competency before the comprehensive exam can be scheduled.

All students are evaluated for their English competency as part of their written and oral rotation reports, candidacy exam, Colloquium, and other components of the degree program. If the student does not demonstrate acceptable competence based on the above evaluations, the student's adviser will be responsible for providing mechanisms for improving these skills. Examples include: 1) verbal critiques of assigned professional papers, 2) presentations in laboratory meetings, 3) additional presentations in Colloquium, and/or 4) successful completion of specific courses designated by the Advisory Committee and targeted toward written and/or spoken English as appropriate. If remediation is required, the Doctoral Committee will re-evaluate the student following completion of the required studies and the student's adviser will notify the Program Chair in writing when the student has met the English competency requirement.

E. Comprehensive Exam

1. Purpose of a comprehensive exam

Successful completion of the comprehensive exam indicates that the student has a broad and in-depth background in biomedical sciences. It marks the watershed from taking courses to being a full-time researcher. The exam serves to allow the committee to thoroughly examine the student's preparation for dissertation research.
2. When does a student take the comprehensive exam?

To schedule and take the comprehensive exam, a student must be registered full or part-time, and must have a GPA of 3.00 as defined by the Program. Generally, the comprehensive exam is taken when a student has finished essentially all coursework and is ready to focus on research work for the dissertation. Typically, students take the exam some time after the second year; however, it is strongly encouraged not to delay beyond the third year. At the request of the appropriate Program or Option Director, the Associate Dean of the Graduate School officially schedules the exam. The date, time and place must be agreed upon by the student and all members of the Doctoral Committee. Once the date, time, and place are determined, and at least three weeks prior to the date, the student must notify the BMS Program Office to schedule the exam through the Office of Graduate Enrollment Services.

3. Who administers the comprehensive exam?

The student's Doctoral Committee administers the comprehensive exam.

4. Format of the comprehensive exam

The exam includes both writing and orally defending a research grant proposal. Specific requirements for the comprehensive exam vary among the curricular tracks. Students should consult the Director of their curricular track for specific guidelines related to the required format.

5. Who grades the comprehensive exam?

The comprehensive exam is not given a letter grade. Two-thirds of the Doctoral Committee must agree that the student has passed the exam. If a failure occurs, it is the discretion of the committee to permit a second exam and to determine the approximate time for administration of the second exam. The comprehensive exam will only be given twice. A second failure will result in the withdrawal from Ph.D. candidacy. This information is relayed to the BMS Program Office which notifies the Office of Graduate Enrollment Services for official entry into the student's record.

6. What are the requirements of the student after completion of the comprehensive?

The student must keep the Doctoral Committee informed of his/her progress on an annual basis. The Dissertation Adviser should be consulted in planning regular meetings of the Committee. At the discretion of the Committee, the student may be required to submit an annual written progress report. Meeting dates of the Committee are recorded on the ‘Graduate Student Progress – Annual Review Form’.

F. Dissertation Research

Critical components of Ph.D. training are gaining the abilities to select a worthy research problem, to organize an approach for problem solving, to design and execute meaningful experiments, to interpret results cogently in light of the work of others, and to produce a scholarly exposition in written form. The candidate will assemble an independent body of work during their dissertation research that demonstrates they have gained these abilities.

It is expected that students will have at least one first-author manuscript submitted or published based on their dissertation research prior to the Final Oral Examination.
G. Dissertation Preparation and Final Oral Examination

Both the Dissertation Adviser and the student are responsible for ensuring the completion of the written dissertation and for adequate consultation with members of the Doctoral Committee. A formal meeting of the Doctoral Committee with the student to discuss the written dissertation is required prior to scheduling the Final Oral Examination. The written dissertation should be in its final form, with appropriate notes, bibliography, tables, etc., exhibiting polished content and style, and be reviewed and approved by the adviser for the distribution to committee members at least two weeks prior to the scheduled meeting.

Normally, no less than three months must elapse between the Comprehensive Exam and Final Oral Examination. Additionally, the graduate program must be completed within six years of passing the Comprehensive Exam or a second Comprehensive Exam is required.

After the doctoral candidate has satisfied all other requirements for the degree and upon recommendation of the Dissertation Adviser and the committee that the written dissertation is acceptable, the Program Chair will submit a request to the Office of Graduate Enrollment Services to schedule the Final Oral Examination. Major revisions to the written dissertation should be completed before scheduling the oral examination and this revised document should be distributed to committee members at least two weeks prior to the Final Oral Examination.

The Final Oral Examination should be a public seminar followed by an oral dissertation defense. The following points may be used as guidelines for evaluation.

Is the research original?
Are proper experimental designs, appropriate techniques, and interpretation of results described in the dissertation?
Is the candidate able to defend the methods, findings, and conclusions of the research?
Is the candidate sufficiently knowledgeable of the literature to place his or her contribution in proper context?
Is the dissertation research worthy of publication?

The decision of the committee will be reported to the Program Chair and to the Graduate School on the forms provided by the Graduate School.
# Ph.D. Degree Check List

1. Admitted to Graduate School: __________ (date)

2. Candidacy Examination: (within three semesters after enrollment in the Ph.D. program)

3. Selection of Dissertation Adviser (immediately following candidacy examination)

4. Recommend members for Doctoral Committee: (in consultation with Dissertation Adviser; completed within one semester of candidacy examination)
   
   i. Official appointment of Ph.D. Doctoral Committee by the Dean of the Graduate School following recommendation by BMS Advisory Committee

5. Coursework (variable depending on curricular track and student interests; only core required courses are listed; students should consult Table 1 of this Handbook, their first-year adviser, and [http://www.pennstatehershey.org/web/gsa/home/studentresources/current/courses](http://www.pennstatehershey.org/web/gsa/home/studentresources/current/courses), for required and elective courses for the curricular track(s) of interest)

## YEAR 1

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<td>1-8</td>
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6. Complete communication requirements (prior to comprehensive examination).

7. Comprehensive examination (typically prior to the beginning of year three; at least 3 months prior to final examination) arranged through Program Chair and Dean of the Graduate School.

8. In consultation with your Dissertation Adviser and Doctoral Committee, determine when your dissertation research is nearing completion and you can begin to concentrate on writing your dissertation.


10. Activate intent to graduate on eLion during the semester of intended graduation; see Thesis Office Calendar (http://www.gradsch.psu.edu/current/thesis.html); deadline is typically within the first two weeks of the semester.

11. By the semester deadline date (http://www.gradsch.psu.edu/current/thesis.html) submit a rough draft of the dissertation to the Thesis Office for format review

12. Draft of dissertation submitted to Dissertation Adviser (at least 4 weeks before anticipated submission to all members of Doctoral Committee)

13. Copies of the draft dissertation including the abstract consistent with the ProQuest/UMI Agreement (limit 350 words) and vitae (one page maximum) in approved Graduate School form to all members of Doctoral Committee

14. Reviewed draft dissertation returned to graduate student for correction (within 2 weeks after received)

15. Receive approval from Doctoral Committee to schedule Final Oral Examination after major corrections are made

16. Schedule Final Oral Examination through BMS Program Office (at least 3 weeks in advance). The Final Oral Examination must be scheduled on a date no later than the published Graduate School deadline for graduation in that semester (http://www.gradsch.psu.edu/calendar/)

17. Public seminar and Final Oral Examination

18. Final revisions to thesis in response to comments from Doctoral Committee

19. Obtain signatures of Dissertation Adviser and Doctoral Committee members on Approval Page

20. Review and approval of dissertation by Program Chair (allow 1 week for review)

21. Submit final dissertation to the eTD Website (http://www.etd.psu.edu/) by the deadline date

22. Submit signed doctoral approval page, ProQuest/UMI Agreement, Survey of Earned Doctorates, and fee (payable at http://www.gradsch.psu.edu/current/thesis.html) to the Thesis Office

23. Acceptance of dissertation by The Graduate School

NOTE: The student is responsible for meeting all time schedule requirements for their degree.
IV. Concurrent Degree Programs

The Graduate School of Penn State University permits undertaking concurrent degrees (http://www.gradsch.psu.edu/policies/faculty/concurrent.html). For example, some students have received Ph.D./M.B.A. concurrent degrees. Students may file a concurrent degree proposal following successful completion of the comprehensive exam. Undertaking a concurrent degree program requires the approval of the dissertation adviser, doctoral committee, the Director of the student’s Program or Option, and the Head of the proposed concurrent degree program, as well as approval from the Office of Graduate Enrollment Services. Registration for a concurrent degree program may require payment of applicable tuition charges by the student.

V. General Information

Stipend – The Penn State University is a direct-deposit pay only. You will receive your stipend at the end of each month.

Taxation of Stipend - This is determined by governmental agencies.

E-mail – Penn State access/e-mail accounts are acquired at Graduate Orientation. All Graduate Education/student information is relayed through Penn State email. Please READ your e-mail.

Vacation/Sick Leave – Full-time graduate students in the BMS Graduate Program who receive stipends are permitted two weeks of vacation leave per academic year (July 1 to June 30). Leave should be arranged at least two weeks in advance with consent of the Program Chair (first-year students) or dissertation adviser (second-year and above students). Students will not be routinely granted vacation leave while enrolled in class work.

For extenuating circumstances, special arrangements may be made for additional vacation days. Such arrangements need approval of the Program Chair (first-year students) or the dissertation adviser (advanced students). Vacation leave days do not accrue from year to year, Holidays designated by The Pennsylvania State University are separate and in addition to vacation days.

No sick leave is formally assigned or earned, but may be used as necessary with approval of the dissertation adviser or Program Chair (first-year students) or the dissertation adviser (advanced students). Under normal circumstances, up to five days of sick leave per calendar year will be granted, when necessary. Sick leave in excess of five days will be recorded as vacation time. It is the student’s responsibility to contact the Program Chair or dissertation adviser when he/she is absent from the classroom or laboratory due to illness.

VI. BMS Faculty Members

The most up-to-date list of the faculty members of the BMS Program with descriptions of their research interests can be found at http://med.psu.edu/web/biomedical-sciences/home/faculty
VII. BMS Advisory Committee

Ralph L. Keil, Ph.D.; Chair of the BMS Graduate Program
Sarah K. Bronson, Ph.D.; Director of the BMS Graduate Program
Richard Courtney, Ph.D.; Co-Director of the VIRIM Option
John Flanagan, Ph.D.; Director of the BMG Option
Todd Schell, Ph.D.; Co-Director of the VIRIM Option
Jong Yun, Ph.D.; Director of the TT Option

Karen Shields, Program Coordinator
(717) 531-1045

VIII. Appendix:
A. Graduate Student Progress – Annual Review Form

**Penn State College of Medicine Graduate Student Progress – Annual Review Form**

<table>
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**Academic Progress**

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Doctoral committee formed: ____________________________

**Thesis Committee Meetings**

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**Thesis Research Progress**

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2nd year | 3rd year | 4th year | 5th year | 6th year |
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**Overall Progress**

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<td>E</td>
<td>S</td>
<td>U</td>
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**Signatures**

O - Outstanding
E - Excellent
S - Satisfactory
U - Unsatisfactory

* Unsatisfactory Overall Progress must be accompanied by a letter from the mentor describing the problem(s).