

**ACADEMIC GUIDELINES FOR STUDENTS
IN THE DEPARTMENT OF BIOCHEMISTRY**

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Current Departmental Chair:	David Cortez
Current Director of Graduate Studies:	Manuel Ascano
Current Graduate Program Manager:	Patricia Mueller
Current Departmental Administrator:	Jennifer L. Smith

Mission Statement

The Biochemistry graduate program is designed to prepare students for successful careers in biomedical research by providing research-focused training within laboratories of member faculty. Students of the graduate program are anticipated to make seminal scientific contributions through original research and (co-)author publications within their chosen area of research.

Admission into the Biochemistry Ph.D. Program

Students enter the Biochemistry graduate program following admission into the Integrated Graduate Program (IGP), the Quantitative and Chemical Biology Graduate (QCB) Program, or the MSTP program. Direct admission to the Biochemistry graduate program is also possible. Students who enter Vanderbilt through the IGP or QCB programs normally select a mentor and Ph.D. program following laboratory rotations at the end of their second semester of study. Eligible mentors for the Biochemistry graduate program are tenured or tenure-track faculty who have a primary or secondary appointment in the Department of Biochemistry. Entry into the Biochemistry graduate program is by consent of the dissertation mentor, Director of Graduate Studies (DGS), and Chair of the Department. Acceptance is contingent upon satisfactory performance in coursework and lab rotations during the first year. Upon joining a lab, student expenses (stipend, tuition, fees, and research costs) become the responsibility of the Ph.D. advisor. When the advisor holds a secondary faculty appointment in Biochemistry, the primary department of that advisor has ultimate financial responsibility for all student expenses throughout their training. As indicated below, some decision-making within the program is made by the Biochemistry Graduate Education Advisory Committee. This committee is composed of the current DGS, the Chair of the Department, the last three faculty who previously served as the DGS, or other designates of the Chair.

Course requirements for the Ph.D. in Biochemistry

A total of 24 hours of didactic courses are required for the Ph.D. in Biochemistry. These didactic courses are comprised of three parts: (1) first year courses required for all entering students as part of the IGP or QCB programs (16 hours are usually completed in the first two semesters, which may include elective hours), (2) those required by the Department of Biochemistry, and (3) those taken as electives (6 hours, required in addition to any elective hours completed as part of the 16 hours completed during the first two semesters).

Biochemistry Ph.D. students are expected to have a textbook-level knowledge of general biochemistry, such as would be represented by a classical undergraduate textbook on this subject (e.g. L. Stryer or Voet and Voet) prior to entering the Biochemistry graduate program. A student who did not take biochemistry as an undergraduate or who needs to brush up on this material should do so during their first two years of graduate study (prior to their qualifying exam) either through independent study or through elective course work.

The required courses in the Department of Biochemistry are:

Biochemistry 8327	Seminar/Scientific Communication (Fall)	2 hours
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The Department of Biochemistry offers the following courses as electives:

Biochemistry 8300	Introduction to Structural Biology (Spring)	1 hour
Biochemistry 8301	Enzyme Kinetics & Mechanism (Spring)	1 hour
Biochemistry 8302	Advanced Biochemistry, Cell Biology and Genetics (Fall)	3 hours
Biochemistry 8303	Biomolecular X-Ray Crystallography Prerequisite BCHM 300	2 hours
Biochemistry 8323	Special Problems & Experimental Techniques* (Fall, Spring & Summer before prelims)	1-6 hours

**The mentor of the student is the instructor for BCHM8323 courses. The mentor must provide a written description to the Graduate School of the student's activities for these courses prior to registration. The Graduate Program Administrator will facilitate obtaining the approval from the Graduate School.*

Biochemistry 8336	Biochemical & Molecular Toxicology (Fall)	3 hours
Biochemistry 8337	Molecular Aspects of Cancer Research (Spring)	1 hour
Biochemistry 8343	Biomolecular NMR Spectroscopy (Fall)	3 hours
Biochemistry 8349	Graduate Seminar in Molecular Biophysics (Spring)	1 hours
Biochemistry 8352	Analytical Proteomics (Spring)	2 hours
Biochemistry 7999	Research for M.S. Degree*	Variable
Biochemistry 8999	Research in lab before qualifying exam*	Variable
Biochemistry 9999	Research in lab after passing qual exam*	Variable

*Research project courses [Biochemistry 7999, 8999, and 9999] are not considered didactic courses.

The Graduate School requires 72 hours (didactic and research—minimum of 24 didactic--) for a Ph.D.

A typical curriculum for a Biochemistry Ph.D. follows:

	Total Credits	Didactic Credits
Year 1 - IGP or QCB core courses and electives	16	16
Year 1 Summer Semester		
BCHM 8999 - PhD Dissertation Research	6	
Year 2 Fall Semester		
BCHM8327 - Seminar/Scientific Communication	2	2
Elective(s)	3	3
BCHM 8999) - PhD Dissertation Research	4	
Year 2 - Spring Semester		
Elective(s)	3	3
BCHM 8999 (379) - PhD Dissertation Research	6	
Year 2 - Summer Semester		
BCHM 8999 (379) - PhD Dissertation Research	6	
Total Credits at End of Second Year	46	24
Year 3 and 4 - BCHM 8999/9999 (Ph.D. Dissertation Research)	26	
Total Credits Needed for Graduation	72	24

The exact timing of when the student completes the required hours BCHM 8999/9999 needed to reach the 72 hour total for the Ph.D. program is flexible.

In addition to the Graduate School requirement for an overall ‘B’ average, the Department of Biochemistry stipulates that students who obtain one ‘F’ or 2 ‘C’s in any courses, which include first year IGP/QCB courses, will not be permitted to continue. Exceptions to this rule will be permitted only by consent of the Biochemistry Graduate Education Advisory Committee. Any such exceptions will include probationary conditions.

Student and Advisor Expectations and the Laboratory Compact

The primary goal of the laboratory rotation process is to provide a structured opportunity for students and principal investigators to find a mutual match. There is no ‘perfect’ rotation format that will provide a student and advisor a truly comprehensive sense of whether an optimal match was made. Context-specific stressors often arise well after the rotation period – and these unanticipated events can present as a significant challenge to the interpersonal relationship between advisor and trainee. These challenges often derive from or are exacerbated by an insufficient level of communication regarding the expectations of student and advisor with each other. *To improve communication and avoid surprises, advisors that train graduate students of the Biochemistry Graduate Program are required to have a Laboratory Compact that they share with students upon their entry into their respective laboratory (or earlier).* The intent of the laboratory compact is NOT to strictly standardize the expectations between students and advisors across the

entire Biochemistry graduate program. Rather, the laboratory compact is intended to serve as a transparent communication tool that defines the ground rules specific for a given lab and its unique culture. It should outline the responsibilities of both the student and mentor. The laboratory compact is expected to include, but is not limited to, the following topics:

- Work hour and attendance expectations including vacation policy
- Expectations for how to be a good laboratory citizen
- Expectations for record keeping including laboratory notebooks and data archiving
- Expectations for scholarly development and training
- Expectations for participation in seminars, lab meetings, journal clubs, Biochemistry department activities, and other events.
- Description of the manuscript preparation and publication process.
- Responsibilities of the mentor such as providing resources, advice, evaluation, etc...

The laboratory compact is a tool for both the mentor and student. It is an addendum to and not a substitute for regular communication, completion of IDPs, and other advising activities.

The Qualifying Examination

Background

The qualifying exam is an essential component of a student's training and is intended to assess readiness to conduct original research in her/his chosen field. It is a thoroughly individualized evaluation of the student's progress in thinking independently, demonstrating fluency of knowledge within a research field, and being able to critically integrate empirical evidence to enable the synthesis of new ideas and hypotheses. In addition, and as important, the qualifying exam is an opportunity for students to learn and refine their stress management and resiliency skills. The qualifying exam is NOT intended to be a 'hazing' experience or an intramural competition.

The primary goals of the qualifying exam are:

- 1) To provide an assessment of whether the student has a satisfactory general knowledge of biochemistry and related areas of genetics, cell and molecular biology. This means a textbook-level knowledge of general biochemistry and an IGP Bioregulation-level knowledge of genetics, cell and molecular biology.
- 2) To determine whether the student is able to articulate and defend sound scientific hypotheses and specific aims to test such hypotheses. This includes: knowledge of the background literature relevant to the general area of the student's research; ability to generate compelling research questions; and an ability to propose approaches that will accomplish the aims of the project with an understanding of the potential pitfalls of these approaches.
- 3) To assess the student's aptitude and motivation for completing the Ph.D. degree.
- 4) To evaluate a student's ability to write and orally defend a proposal and to provide an opportunity to practice these presentation skills.
- 5) To engage a committee of faculty in the student's training.

6) To provide a required point of reflection and evaluation by the student to consider whether pursuing a Ph.D. continues to be the proper path for the student's career.

Prior to the qualifying exam the DGS, mentor, and Department Chair will serve as the advisory committee for entering students.

Rules regarding the qualifying exam

The qualifying exam is typically completed one year after entering the Biochemistry graduate program, in the summer following completion of the course requirements. The dates outlined below can be changed with the consent of the DGS, mentor, and department Chair.

Passing the qualifying exam admits students to Ph.D. candidacy. The qualifying exam is comprised of a written research proposal and an oral examination by an exam committee.

The following sections explain the procedures for the qualifying exam.

i). Students taking their qualifying exam will have completed Biochemistry 8327 (Scientific Communication), usually during the Fall semester before their spring qualifying exam. This course includes specifics on how to prepare a grant proposal and in-depth discussions on good grant writing practices, common concerns and mistakes. The aims of the 8327 proposal are the tentative aims of the student's Ph.D. project, as determined by the student and her/his advisor.

ii) The DGS will hold a January or February meeting with all students preparing to take the qualifying exam to overview the process and address student questions.

iii) The topic for the qualifying exam will comprise of at least one aim from the student's thesis project and at least one additional aim of the student's own device. It is expected that this independent aim will be related to their thesis research *but is not an active research direction within the lab that is known to the student*. The independent aim should be related to the general topic of the other aim(s), but should not be dependent on the success of the other aim(s). Students are strongly encouraged to consult with their advisor, other trainees, or other program faculty as a sounding board before finalizing their aims. However, the independent aim is expected to be a student product and the advisor should not provide significant input into its final crafting.

iv) The student will first write and submit a preliminary Specific Aims page for his/her qualifying exam research proposal (1 page limit, 11 or 12 point font). This document should describe the hypotheses to be tested and list the specific aims designed to test the hypotheses. The general experimental approaches and methodologies utilized to test the hypotheses should be briefly described. A list of up to five references to aid the Examining Committee in evaluating the aims should also be included. The Specific Aims page should be submitted to the DGS on or before March 1. The specific aims page should include the name of the student, the title of the proposal, and should indicate these are *qualifying exam* aims.

v). The Qualifying Exam Committee will be comprised of at least four members of the graduate faculty, three of whom must have primary or secondary investigator-track appointments in the Department of Biochemistry, one of whom must be tenured. One committee member should *not* be a primary faculty in Biochemistry. *The student's advisor is not on the Exam Committee, but will join the other members of this committee to*

constitute the student's full Ph.D. Committee. The student and advisor should first draft a list of 5-6 possible Biochemistry faculty in order of preference and 3-4 non-departmental faculty and present this list to the DGS for approval. Members of the committee should not include a student's or advisor's family member. Upon DGS approval, the student may then solicit commitments by faculty members on the list until the committee is composed. The DGS will then appoint the committee chair. Committee chairs will be selected from a pool of primary faculty that have served on at least two Biochemistry qualifying/thesis committees.

vii) Approval of specific aims. Once their committee is composed, the student will provide their specific aims page to each committee member and no later than one week prior to the pre-qualifying exam meeting. The student will schedule a one hour pre-qualifying exam meeting with their committee within the March 15-April 15 time range. *The Ph.D. advisor must attend this meeting and advise the committee regarding the nature of the proposed aims, in particular confirming that the student's independent aim(s) was developed without significant advisor input.* Once a time and date is found, the student will inform the Graduate Program Administrator and confirm the date, time and place with the Exam Committee. The student should work with the Departmental Administrator to reserve a room for the meeting. At the pre-exam meeting the student will present their qualifying exam proposal aims to the committee in a presentation that includes no more than 2 introductory slides and one slide per aim. During the one hour meeting, the student should make clear which aim(s) on the proposal comprise their actual thesis research, and which aim(s) represent their independently crafted one. The committee will determine whether the student's anticipated qualifying exam research proposal (based on the Specifics Aims) will be "defendable" in a qualifying exam. If not, the committee will help the student to craft aims that appear to be defendable. This adjustment of aims can take place either at that meeting or immediately following via iterative e-mail. When evaluating the student's aims, the committee should keep in mind that the student was tasked with proposing a project that included both thesis goals and non-thesis goals that still fit within the timeline of a typical thesis project. Thus, the thesis aim(s) likely do not include all of the goals of the thesis project. Furthermore, to construct an aim of the student's own device, the student may propose an aim substantially divergent from the other project aim(s).

The committee will also preview with the student the likely types of questions that will be asked at the actual oral qualifying exam. While any question is allowable at the exam, the Biochemistry graduate faculty recognize that there is a vast amount of background information in biochemistry. Thus, while a textbook knowledge of basic concepts is expected, the committee will provide guidance to the student of what advanced knowledge is needed tailored to the student's field of research and the objectives outlined in the qualifying exam proposal.

viii) Scheduling the qualifying exam. The student should schedule a date and time for the qualifying exam at the same time as scheduling the pre-exam meeting. The qualifying exam meeting should normally take only 2 hours, but should be scheduled for 2.5 hours in case the committee needs extra time for discussion. This exam should be scheduled no earlier than 4 weeks after the pre-qualifying exam meeting and no later than June 1. The Graduate Program Administrator will be informed of the scheduling of the qualifying exam as soon as possible by the student and will reserve a room for a 2.5 hour block of time for the oral qualifying examination. The student should work with the Graduate Program Administrator to reserve a room for this meeting

ix) Written qualifying exam proposal. The written component of the qualifying exam is a grant proposal, in the style of an F30/F31 NIH grant application. The proposal section consists of one Specific Aims Page and no more than 6 pages of Research Strategy consisting of Background and Significance and the Research Plan including all preliminary data, figures, and approaches. References should be included but do not count towards the page limits. A face page should also be added that includes the name of the student, the name of the advisor, the title of the proposal, and the date, time and place of the oral exam. The student is responsible for all scientific aspects of the proposal including background information, approach, experimental design, and methodology for all experiments. The student may consult with anyone concerning methodologies, format, references, etc. Students are free to orally discuss the proposal with their advisor or other faculty and also to have students or postdocs (but not faculty) critique the written proposal. The student's mentor should not provide significant input into the independent aim(s) of the proposal. Critiques of the proposal should be limited to comments and not include any editing of a written proposal. Faculty cannot attend practice qualifying exams.

Students often have questions about the appropriate scope of the proposal. The following guidance should be considered:

- a. The student should assume a timeline of three to four years for the proposed experiments.
- b. The experiments should realistically be accomplishable with typically available resources, but students do not have to limit themselves to any specific methodologies. Students can propose to generate new reagents or methods if they can justify how that could be accomplished within a typical thesis project timeline.
- c. Not all aims must be hypothesis driven and unbiased approaches can be appropriate. However, there should be some hypotheses tested within the project.
- d. Aims are not equivalent to experiments. Students should consider what would be required to publish should their methods be successful. A typical thesis project would be expected to result in more than one publication.
- e. The student should be able to place the proposal in the context of what is already known, define what will be learned, and explain the significance of the expected outcomes.
- f. A student may need to cut parts of their actual thesis proposal to accommodate the independent aim of the qualifying exam proposal.
- g. The independent aim of the qualifying exam proposal should rely on much of the same background information, but it should not be dependent on successful completion of the other aim(s) and may diverge significantly from the other aim(s).
- h. Expected pitfalls and alternative approaches should be included in the research strategy.
- i. The student should pay particular attention to whether the approaches outlined in the research strategy would be sufficient to accomplish the aims proposed.

The student should provide the qualifying exam research proposal to the qualifying exam committee no later than one week prior to the oral qualifying exam. The mentor should also provide the committee chair with a letter providing an evaluation of the student's performance to date, at least one day prior to the oral examination. In advance of the oral exam, the Graduate Program Administrator should provide the chair of the committee with a copy of the student's Vanderbilt academic record. The Administrator will also provide the examination outcome forms the student taking the exam. These forms are to be completed and returned by the committee chair to the Program Administrator following the exam.

At the exam, the committee will decide whether the written proposal meets the minimum expectations of the committee and is defensible. If the committee is unanimous in their evaluation that the written proposal does not meet the minimum requirements, then this will be considered a failed exam and the student will be informed of the deficiencies that must be corrected. If at least one of the committee members judges the written proposal to meet the minimum requirements, then the student will be invited to present their proposal at the oral exam using no more than 15 simple-format slides. During the oral qualifying exam the student should demonstrate:

- Mastery of knowledge concerning the background, methods, and literature related to their specific project.
- A firm grasp of textbook-level biochemistry. This does not imply extensive memorization of metabolic pathways, etc., but does imply fluency in all major areas of biochemistry as defined by the consensus topical composition reflected by most biochemistry textbooks (for example, those authored by Stryer and Voet and Voet).
- An understanding of cell and molecular biology and of genetics at a level consistent with what is taught in the Bioregulation course for first-year IGP students.
- The ability to think critically, defend the proposed science, and communicate reasonably well.
- The approaches proposed are generally sufficient to complete the aims and test the proposed hypotheses.
- Completing the proposed research would provide a significant advance to the field of study.
- General student motivation and track record in terms of work ethic, lab aptitude, responsible conduct of research, general motivation, and scholarship are also expected to be satisfactory. These traits will be evaluated in part based on the advisor's letter to the committee and the student's course grades.

The possible outcomes of the qualifying exam are pass or fail with a single opportunity to re-take a failed exam. Generally, the retake is expected to happen within 60 days. A longer timeline requires the consent of the DGS and mentor. At the conclusion of the student's oral defense, the chair of the committee will tally a blind vote to determine the initial impression of each member on whether the student passed or failed. After the initial vote, the committee will proceed through a balanced discussion of the merits of the written and oral portions of the student's exam; the committee should make every effort to arrive at a unanimous or majority decision. If the vote is a tie, then the result will be considered a failed exam.

Whether or not the student passes or fails, the committee chair will provide the student verbal and written feedback regarding the strengths and weaknesses with specific recommendations for improvement. Students that fail the initial try will be given a single opportunity to re-take the exam. The committee may request the student to redo the written, oral or both parts of the exam. A pass may in some cases be accompanied by a requirement by the committee that the student carry out certain tasks (such as completing specific research training or coursework) in order to be considered a Ph.D. candidate in good standing, as will be assessed at future Ph.D. committee meetings.

If a second oral exam needs to be scheduled, the student should poll the committee for this purpose, with the Departmental Administrator then helping to locate a suitable room. As

for the initial exam, the student should provide their committee with their proposal (revised, if needed) at least a week prior to the exam.

Following the exam (or both exams, if the student takes the exam twice), a letter addressed to the student should be prepared by the committee chair that summarizes committee discussion and states the outcome of the exam. This letter is sent to the student, the Ph.D. advisor, DGS, and the Program Administrator.

The DGS maintains a “qualifying exam checklist” document that provides a detailed checklist and timeline for the qualifying exam process. To receive a copy just request this from the DGS.

3. Required Research Presentations

The Biochemistry Student Association (BSA) holds a research presentation series (BSA colloquium) in which Biochemistry students (and sometimes others) give seminars on their research. Biochemistry Ph.D. students are required to present in this series twice before graduating. The first presentation is during the year immediately following passing the Qualifying Examination and is comprised of a 25-30 minute oral presentation (including question/answer time). This first presentation can focus on plans as well as progress to date. The second presentation is a full length seminar (50-60 minutes, including Q/A) on research progress and is typically given during the 2nd or 3rd year following passing the qualifying exam. These presentations provide students with experience in public speaking to a broad audience, as well as providing a venue for showcasing research going on in the department and receiving feedback from colleagues. The scheduling of these presentations is coordinated by the BSA leadership.

4. Dissertation Research and Ongoing Evaluation

The Ph.D. Committee is comprised of the Qualifying Examining Committee plus the student’s Ph.D. advisor. The chair of the Qualifying Examining Committee will serve as chair of the Ph.D. Committee. If for some reason, the chair is unable to fulfill this obligation, the DGS will appoint another tenured member of the Biochemistry primary faculty as chair. Additional committee members may be added. This may be helpful if the dissertation broadens in scope and would benefit from the participation of a faculty member who can contribute relevant new expertise. If it becomes impossible for one of the five members to continue on the committee, meetings can proceed with a minimum of four committee members present, as proscribed by the Graduate School. Changes in the composition of the Dissertation Committee must be approved by the DGS.

Regular meetings of the Ph.D. Committee should be held at least once each academic year or more often as advised by the committee or mentor. Students may also request an “emergency” meeting with their committee to address acute crises. The regular meetings are to keep the committee informed of progress and to provide an opportunity for the committee to advise the student with regard to unforeseen problems or new avenues of research. It is the responsibility of the student to schedule these meetings and then inform the Graduate Program Administrator of the date, time, and place. Ordinarily, meetings should be scheduled for 90 minutes. Students are encouraged to employ an on-line scheduling tool such as “Doodle” to poll faculty regarding availability for committee meetings. The student should work with the Graduate Program Administrator to reserve a room for these meetings. The student should also provide the members of the committee with a 3-5 page (including figures and references) summary report of research progress/plans one week before the scheduled meeting. In addition, a face page should also be included that gives the student’s name, project title, advisor’s name, and time and place of the meeting. *Please note that*

the format of this report for the first committee meeting following a successful qualifying exam is different from subsequent reports, as follows. The “report” for the first post-candidacy meeting should be written in the style of a short research proposal that gives the aims of the Ph.D. project, background and significance, a plan of attack and, as appropriate, a short description of progress to date, including references for any publications. This document should be roughly 5 pages long (single-spaced) plus a cover page (with name, project title, and the date, time, and location of the meeting, plus references. It is advisable that the advisor look at this document before the student finalizes it and distributes it to the committee.

The Graduate Program Administrator will provide meeting outcome/evaluation forms to both the student and the committee chair. At the conclusion of each meeting the committee will fill out a numerical progress evaluation form that is utilized as data for the Southern Association of Colleges and Schools accreditation (SACS) process. The Biochemistry Graduate Program does not provide these numerical rankings to the student since these numerical scores do not adequately capture the context and nuance of the committee’s evaluation. If a majority of committee members deem overall progress to be unacceptable, this will be indicated on this form and the Ph.D. advisor will also enter a grade of U (unsatisfactory) for Biochemistry 9999 at the end of that grading period. Two consecutive or three total unsatisfactory progress reports will result in termination from the Ph.D. program. The expectation is that students will not be surprised by a ranking of unacceptable because of previous discussions with the primary mentor indicating that this is a possibility based on the mentor’s evaluation. In addition, with the committee chair’s guidance, the student will draft a summary of the meeting, comprising the committee’s discussion, evaluation of strengths and weaknesses, suggestions for improvement, and the timing of the next meeting. Once fully drafted the letter should be circulated amongst committee members for final approval, and returned to the student. Both the letter and the evaluation forms should be submitted to the Graduate Program Administrator and DGS.

A minimum of one publication in a peer-reviewed journal with the student as the primary (first or co-first) author is required for receiving the Ph.D. in Biochemistry. This publication requirement should not be viewed as sufficient for obtaining a Ph.D. Instead, it is one metric that indicates a student has made sufficient progress towards the competencies required of a Biochemistry Ph.D. A defense cannot take place unless such a paper has been fully accepted by the journal at the time of the defense. The Ph.D. Committee has the responsibility to see that this requirement is fulfilled before a Ph.D. defense takes place. Review articles, chapters based on proceedings of symposia and meetings, and manuscript submissions to pre-print servers (e.g. bioRxiv) do not satisfy this requirement. This requirement can be waived, on a case-by-case basis, by consent of the Biochemistry Graduate Education Advisory Committee. If such a situation arises, the student’s advisor must provide the Advisory Committee a letter stating the rationale behind the request.

Upon completion of the dissertation project to the satisfaction of the Ph.D. Committee, the student will prepare and submit a dissertation, in accordance with the rules of the Graduate School. Students must receive approval from their Ph.D. Committee prior to scheduling their final examination. The completed dissertation should be submitted to the members of the Ph.D. Committee no later than two weeks prior to the day of the final examination. It is the responsibility of the student to notify the DGS, the program administrator, and the office of the department Chair in advance of the time and place of the examination and of the title of the dissertation. This should be completed no later than two weeks prior to the examination.

5. Mental Health and Wellness

Graduate students will encounter many challenges and stresses as they pursue their dissertation research. The progress made from ‘successful’ experiments can feel inadequate compared to the

number of ‘failed’ experiments one has to endure. In addition, unanticipated life or external events can be further cause for disruption – and such patterns can put significant strains on the mental health and wellness of a student. It is important to recognize that successful management of, and increased resiliency to, stress is a combination of a student’s awareness of their state, the support and resources provided by their advisor and laboratory, and the support and resources of the Biochemistry Graduate Program and the greater Vanderbilt institutional resources available.

Students should be aware of the following resources:

One point of contact for a student is their primary mentor. Other contacts within the department are the Biochemistry Program Manager, DGS, and Department Chair. They are available to help advise and direct students to additional resources.

The BRET office maintains a Graduate Student Resource web page (<https://medschool.vanderbilt.edu/bret/graduate-student-resources/>) that provides up-to-date links to school- or university-wide resources for students seeking more information about *wellness*, *counseling*, and *urgent concern* services and contacts. The Biochemistry website, under Information for Current Students, contains additional information on the services of the University Counseling Center, the Center for Student Wellbeing, and the Project Safe-Center for Sexual Misconduct Prevention and Response.

The Office of Student Care Coordination, part of the Student Care Network at Vanderbilt, is a point of contact for students who may have an academic, personal, emotional, medical, and/or other concern. Student Care Coordinators individually assess each student’s needs and explore resources within Vanderbilt’s Student Care Network and/or the Nashville community to facilitate connections to the most appropriate supports.

The University Counseling Center maintains counseling services that can be accessed through the Office of Student Care Coordination.

Finally, the BSA has a Wellness committee whose mission is to organize events throughout the academic calendar that focus on community, boosting morale, and empowering Biochemistry graduate students to develop self-awareness, stress management, and mental resiliency skills. Moreover, the Wellness committee is a peer-level support group that can help inform students of the wellness and counseling resources that are available.

5. The Final Examination

The initial phase of the Defense of the dissertation takes place as part of a public seminar of the Department. The members of the Ph.D. Committee are required to attend. After the public seminar is over, the candidate and members of the Ph.D. Committee adjourn to conclude the examination in private. The examination may cover any area or topic ranging from basic knowledge to future research directions. Typically, the private examination is a change for high-level discussion of scientific concepts between colleagues. The result of the examination should be reported to the student immediately afterward.

In some cases, Ph.D. Committees require extensive revisions to the dissertation prior to acceptance. In these circumstances, students are strongly discouraged from leaving Vanderbilt prior to completing final revisions. In cases in which students do leave, they will be personally responsible for all expenses including a continuing registration fee, *i.e.* this will be paid by the

student, not the advisor. The dissertation advisor and Ph.D. Committee may place a deadline on correcting any deficiencies identified during the final examination. Failure to meet this deadline may result in termination from the program.

Biochemistry students usually complete their graduate studies and defend roughly four to five years after entering graduate school. Completion is required by the Graduate School within four years of successfully passing the qualifying exam. If a student has not completed all degree requirements four years after the qualifying exam, the student may request an extension of six months. An extension request should be addressed to the Director of Graduate Studies and submitted to the Program Administrator at least 8 weeks in advance and should be accompanied by a letter from the Ph.D. advisor indicating the reasons for the extension. Upon consent of the Biochemistry Graduate Education Advisory Committee, the request will be submitted to the Graduate School. A student is allowed a maximum of two 6-month extensions. Students will be dismissed from the program if they have not completed all degree requirements by the end of the second extension period, which is a stated policy of the Graduate School.

6. Requirements for the M.S. in Biochemistry

Students may become candidates for an M.S. in Biochemistry by one of two routes; through failure to be admitted to candidacy for the Ph.D. or as a result of withdrawing (or being terminated) from the Ph.D. program after passing the qualifying exam. Approval for a Master's degree is contingent on completion of the requirements below and also approval by the Biochemistry Graduate Education Advisory Committee in consultation with the student's advisor and Ph.D. committee (if formed). In rare cases, such as in an instance where serious scientific misconduct took place, a student may be denied an M.S. degree even if they have completed the following requirements.

1. Course Requirements

The course requirements for Biochemistry must be complete [a total of 24 hours of didactic courses including Biochemistry 8327].

2. Thesis Requirement

A short thesis describing a piece of original work must be submitted. This must be approved by two members of the Department of Biochemistry (one being the student's advisor, the other usually being the chair of that student's Ph.D. Committee), who are also members of the Graduate Faculty. There will be no examination of the thesis research. The thesis requirement can be waived for students that have already passed the Ph.D. qualifying exam by consent of the student's advisor and the Biochemistry Graduate Education Advisory Committee.

7. Requirements for the Ph.D in Biochemistry as Part of the M.D./Ph.D. (MSTP) Program

MSTP students enter the Biochemistry Ph.D. program at the beginning of the fall semester, following completion of their first two years of medical school. The MSTP program covers tuition and stipend for the student's first year in the Ph.D. program, after which responsibility shifts to the Ph.D. preceptor.

The Graduate School requires 72 hrs for the Ph.D. degree. 48 hours of credit from medical school coursework/training transfer from VUSM years 1 and 2 to the Graduate School and count towards the required 72 hours of credit. (According to the program proposed here 15 hours of the 48 hours of credit count towards didactic credit hours and 33 hours of credit will count for research hours).

This leaves 9 didactic hours of coursework to be completed by the MSTP student during their first year of Ph.D. study.

The 15 didactic hours that transfer to the Biochemistry program are derived from the following year 1 VUSM courses but may change as the VUSM course requirements change:

Human Blueprint and Architecture:	6 hours
Microbes and Immunity	2 hours
Homeostasis	2 hours
MSTP seminar (Fall)	1 hour
Endocrine, Digestion, and Reproduction	2 hours
Brain, Behavior, and Movement	1 hour
MSTP seminar (Spring)	1 hour

The coursework to be completed by the MSTP student during their first year in the Biochemistry Ph.D. program is as follows:

MSTP seminar (Fall)	1 hour
Biochemistry 8327 (Scientific Communication)	2 hours
Electives	6 hours

Electives should be chosen based on student's interest and should be approved by their mentor.

After joining the Ph.D. program, students will continue to participate in the MSTP seminar, but register only for the Fall semester of year 1 in the Ph.D. program.

In addition to the above didactic requirements, students will need to complete 15 hours of research after joining the Ph.D. program to reach the 72 total hours required for a Ph.D.

Students will work with their advisor and the DGS to compose a Ph.D. committee according to the same timing and criteria as for the standard Ph.D. program (see earlier sections of this document), with one exception: one member of the Ph.D. committee should be a current or former member of the MSTP Faculty Advisory Committee. This member can be either one of the 5 required members or a 6th member of the committee.

The qualifying exam process is exactly the same for MSTP students as for regular Ph.D. students. The same is true for all post-candidacy requirements for completing the Ph.D. degree. In terms of timing, MSTP students undertake the qualifying exam process during their first spring after joining the program, in synch with the students in regular Ph.D. program.

MSTP students are typically expected to complete their Ph.D. degrees by the end of their 4th complete year in the program (end of 6th year after entering VUSM). However, the requirements for the Ph.D. are identical to those of other Biochemistry graduate students.

MSTP students are strongly encouraged to apply for an NIH F30 fellowship during their 1st year of Ph.D. training. The proposal developed in Biochemistry 8327 (327) can often be adapted for this purpose, in which case students would likely submit their applications for the April or August deadlines. The MSTP office provides assistance with preparing and submitting these proposals.

8. Procedures for Switching Dissertation Laboratories

Owing to a number of possible circumstances, a student may need to switch laboratories and change their dissertation research topic. It should be emphasized that such occurrences, while infrequent, do occur. In such cases, the Biochemistry Graduate Program aims to advise and provide students the necessary resources to facilitate a smooth a transition as reasonably possible.

The student is advised to contact the DGS and Biochemistry Program Manager to inform them of the situation. After this initial meeting, the DGS and/or Program Manager will communicate with the student's advisor to gain additional background information and to assess the next steps; as appropriate, the student's thesis committee chair will also be consulted. Students should also consult with at least one additional mentor/advisor prior to making a final decision to switch laboratories. Once it is clear that the best path forward is for the student to switch labs, then the student will work with the BRET office to identify a new laboratory and thesis advisor. BRET Office will support the student during the transition to a new group. Specifically, the BRET office will support a student to conduct up to two 4-week rotations in any group within the School of Medicine led by a member of the graduate faculty that has expressed an interest in considering the student for pursuit of their thesis research. To begin this process, please contact the Senior Associate Dean for BRET, Dr. Kathy Gould. Should the student switch to a laboratory whose PI is not affiliated with the Biochemistry graduate program, the student and new advisor must make a decision as to whether the student wishes to remain part of the Biochemistry Graduate Program or transfer programs altogether. Remaining part of the Biochemistry Graduate Program is dependent on the new advisor becoming a Biochemistry Graduate Program preceptor, which requires application to the Chair. Any student that switches to a new Biochemistry Graduate Program preceptor should immediately inform the Program Manager and Biochemistry DGS. They should also form and meet with their new thesis committee within 6 months of transferring laboratories.