

Handbook of the Graduate Program
in
Biochemistry and Molecular Biology

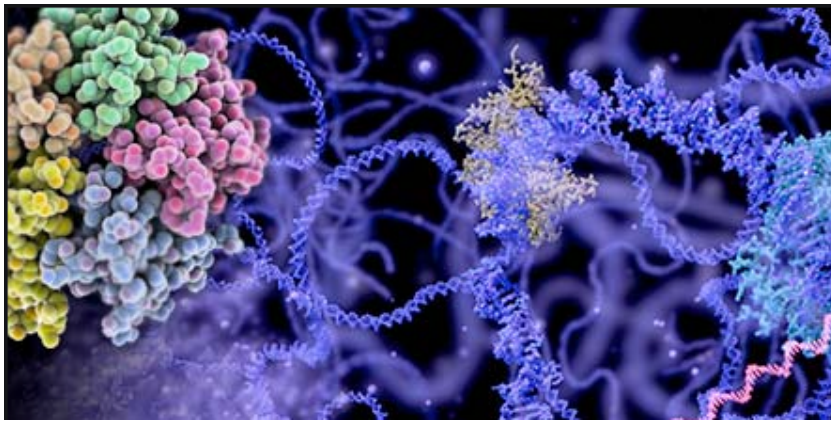


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West Virginia University
School of Medicine

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I. ENTRY TO THE GRADUATE PROGRAM

A. General Biomedical Sciences Program

Entry into the Biomedical Sciences Program is governed by the handbook for the Graduate Programs in the Biomedical Sciences (GPBMS) developed by the Health Sciences Center Office of Research and Graduate Education (HSC ORGE). The GPBMS handbook outlines the activities, requirements, and standards for students and faculty that are shared by all 7 of the degree-granting PhD programs in the biomedical sciences.

The GPBMS handbook can be found online (click [HERE](#)).

The GPBMS handbook also provides global policies and useful information common to all graduate programs that will govern student activities throughout the PhD degree. If this information needs to be amended, students and faculty will be informed in writing of the change and will be governed by the new information. The information in this handbook supplements the information that can be found in the WVU Graduate Catalog. This catalog can be found online at: <http://catalog.wvu.edu/graduate/>.

B. Biochemistry and Molecular Biology program

At the end of the Fall semester of the first year, students choose a mentor in one of 7 Biomedical Sciences Programs. If the student chooses to perform his/her dissertation in a laboratory in the Biochemistry and Molecular Biology (BMB) graduate program, this BMB handbook will supplement the GPBMS handbook. The graduate catalog contains allowances for programs to have more specific or stringent standards. In those cases, the BMB program handbook supersedes the Graduate Catalog.

II. BIOCHEMISTRY AND MOLECULAR BIOLOGY PROGRAM REQUIREMENTS

GOALS AND OBJECTIVES OF THE PROGRAM

This Handbook developed by the Faculty of the Graduate Program in Biochemistry and Molecular Biology outlines the requirements for graduate training leading to a degree in Biochemistry and Molecular Biology. This program adheres to the standards set forth by the American Society of Biochemistry and Molecular Biology (ASBMB) and the International Union of Biochemistry and Molecular Biology (IUBMB).

IUBMB Standards for the Ph.D. Degree in the Molecular Biosciences*

1. The candidate should demonstrate a general knowledge of physics, chemistry, biology and cell biology, biochemistry and molecular biology, and a detailed knowledge of his or her area of research.

2. The candidate should be familiar with the research literature in biochemistry and in their specific field of study and should have the ability to keep abreast of major developments and to acquire a working background in any area.
3. The candidate should demonstrate skill in the recognition of meaningful problems and questions for research in Biochemistry and Molecular Biology.
4. The candidate should possess technical skill in laboratory manipulation.
5. The candidate should demonstrate that oral, written, and visual communication skills have been acquired.
6. The candidate should demonstrate skill in designing experimental protocols and in conducting productive self-directed research.

*This list is adapted from the publication "Ph.D. Degree in the Molecular Biosciences".

<https://iubmb.org/publications/standards-for-the-doctoral-degrees/>

In addition to the information contained in this handbook, the student is urged to also consult the current Graduate School Catalog for additional information regarding the requirements of the Graduate Council at West Virginia University.

A. Formal Course Curriculum

A sample curriculum is provided at the end of this document.
The Ph.D. program should be completed within 5 years.

A.1. Formal Courses

During the first semester of study, the student will take the undifferentiated core curriculum. If the student decides to join the Biochemistry and Molecular Biology Graduate Program at the end of first semester, they will take [BMS 715](#) (Molecular Genetics) during the second semester. The remainder of the student's plan of study is designed under the guidance of the student's advisor and will ultimately need to be approved by the student's advisory committee.

The student is required to take two advanced courses, one of which must be a Biochemistry and Molecular Biology Graduate Program advanced course. These courses include:

- Advanced Protein Chemistry and Enzymology ([BIOC 750](#)) taught in the spring of even numbered years
- Advanced Molecular Biology ([BIOC 751](#)) taught in the spring of odd numbered years

- Biochemical and Oncogenic Signaling ([BIOC 701](#)) taught in the fall of every year

The second advanced course is an elective. The elective should be a graduate level course to complement the student's background as well as research interests. The student must consult with their advisor when choosing an elective. Suggested electives include:

- Advanced courses offered by other School of Medicine Graduate Programs
- Advanced courses (graduate level) offered in the Departments of Biology, Chemistry or the Davis College of Agriculture.
- Another advanced course in the Biochemistry and Molecular Biology Graduate Program

Additional coursework is optional. Many students find that they desire additional enrichment. West Virginia University requires that students be continuously enrolled in at least one credit each semester (including summer session) between achieving candidacy and defending their dissertation.

A.2. Journal Club

All students are required to enroll in Biochemistry and Molecular Biology Journal Club ([BIOC 785](#)) each semester that they are in residence. This course involves the presentation and discussion of current research papers. It is also a time for students to become acquainted with the variety of methods used in scientific research. The journal club is facilitated by the Biochemistry and Molecular Biology Faculty. Students may participate in other journal clubs at the discretion of their advisor.

Students who have completed both their research proposal defense and out of area seminar may opt-out of the Molecular Biology Journal Club starting from the following semester. This is contingent upon the student and advisor agreeing that the student has gained sufficient experience in critical assessment of the literature.

A.3. Seminars and Research Forum

The student will present three seminars during their graduate study. For each seminar, the student will register for 1 credit in [BIOC 796](#). ***Student should only register for BIOC 796 during semesters when they intend to present one of these three milestone seminars.*** BIOC 796 is not intended for attending the regular departmental seminar series.

The first seminar is the student's dissertation proposal. This seminar should be given by November 1st of the third year in graduate school. See section C.3 for specific information.

The second seminar is on a subject unrelated to the student's research. The topic is selected by the student, with the approval of his/her advisor and the seminar coordinator. Students may choose to present from the topic of their written qualifying exam (see section C.1.). This seminar should be given during the spring semester of the third year or beyond. A list

of guidelines in preparing this seminar should be obtained from the seminar coordinator once the topic is selected. See section C.5 for specific information.

The third seminar is the student's dissertation defense. See section C.6 for specific information. ***Students are expected to complete their dissertation defense by the end of their 5th year. See section C.7 for a full description of time to degree regulations.***

Students will also be asked to give an informal works-in-progress presentation in the Department of Biochemistry Research Forum. This forum is designed to keep members of the department abreast of new research findings, provide an opportunity for students to discuss and trouble shoot experimental problems, and to permit students to develop skills in presenting and defending their research results. This forum is not meant to be an opportunity to give a formal seminar. A schedule for the forum is developed at the beginning of each semester and the advisor selects which lab personnel will give a presentation. Students are strongly encouraged to fill out evaluation forms of other graduate students' presentations. This not only greatly aids their peer's professional development, but also help the student learn how to provide constructive feedback.

In the student's third year their dissertation proposal seminar may be used to fulfill the Research Forum presentation requirement, if the advisor agrees.

In addition to the BIOC 796 seminars and the departmental research forum, students may have the opportunity to speak at retreats, research forums in other departments, the Van Liere Student Research Convocation, and national meetings. Any opportunity to practice oral communication skills is strongly encouraged by the Biochemistry and Molecular Biology Graduate Program.

The Department of Biochemistry also hosts a weekly seminar series in which individuals from outside the department are invited to speak about their research. Time is allotted for the students to meet with invited seminar speakers generally at a lunch following the seminar. Each semester, the graduate students as a group are encouraged to invite a speaker of their choosing. A graduate student representative(s) will coordinate this effort with the seminar coordinator.

Students should attend all departmental seminars and research forums. Experiments and other obligations should be planned to allow attendance of these very important educational opportunities. Registration for BIOC 796 is only for one of the student's three milestone seminars, not for attendance of the Departmental seminar series; however, repeated absences from these events may result in the required enrollment of graduate seminar credit that will be graded based on attendance.

A.4. Experiential Learning (BMS 707)

The Experiential Learning requirements are governed by the GPBMS handbook section VI.B.

All students are required to take 2 credits of experiential learning prior to graduation. The

syllabus in the appendix of the GPBMS handbook provides more details on this course. The overall goal is for students to participate in an activity that better informs either their research questions or a career goal. This activity needs to be something that would not otherwise occur during the student's dissertation research. Students are encouraged to think broadly and develop unique experiences. A folder on SOLE (under Health Sciences Center Graduate Programs -> Biomedical Graduate Program) contains sample ideas. For this course, 1 credit hour is defined as 45 hours in the activity. This is a loose guideline and should not be considered the upper limit of time spent. Students can choose to enroll twice for 1 credit each time or enroll once for 2 credits. Financial assistance will be available to defray the cost of these experiences. Students must complete an application (available on SOLE) and have the activity approved prior to enrolling in the course. Connor Ferguson will receive applications, evaluations and can answer questions on this course.

A.5. Teaching

Teaching experience is a valuable part of Ph.D. training. Every effort will be made to provide the student with training in this area. Students with a particular interest in teaching should make this known to both their advisor and the graduate program director so that ample experience can be planned. Possible experiences include a teaching practicum taught in combination with other graduate programs and presenting a lecture in a course.

A.6. Doctoral Research

The dissertation advisor is the student's sole advisor in the graduate program. Most of the student's time in the graduate program will be devoted to conducting their dissertation research. Students register for research credits each semester as BIOC 797, and their performance is graded satisfactory or unsatisfactory by their dissertation advisor. The expected learning outcomes, mechanism of evaluation, and criteria for grade for this course are described in the [BIOC 797 syllabus](#). Students are expected to make progress on their research while engaging in course work, journal club, teaching, and seminar attendance.

A.7. Choosing a Mentor

During the first semester of study, students will be provided a list of available mentors in the Biochemistry and Molecular Biology Graduate Program. The student will choose three laboratories to carry out a rotation. After completing these rotations, the student will decide, in consultation with the Graduate Studies Committee, which laboratory they will conduct their dissertation research.

Under special circumstances a student may directly enter a mentor's lab and be exempt from rotations. This exemption must be approved by the Office of Research and Graduate Education and requires extensive prior experience in the mentor's laboratory or documented substantial communication with the mentor. These requirements are listed in section VII of the GPBMS handbook. Students may also directly enter the mentor's laboratory if they are admitted to the BMS program under the Biochemistry and Molecular Biology Programs fast track program. Students in this program must have graduated from an ASBMB accredited

undergraduate program and performed extensive undergraduate research within the mentor's laboratory. These students are permitted to challenge the Qualifying exam during the Summer prior to their admission start date. Passing of the Qualifying Exam is required for the student to demonstrate sufficient background knowledge to directly enter the program stream without a requirement to pass Foundations I and II.

A.8. Vacations, Sick Leave, and Work Schedules

Graduate students at West Virginia University do not receive a specified number of sick days or vacation days per pay cycle or calendar year. Graduate students in the Biochemistry and Molecular Biology Program should discuss vacation and sick policies with their advisor. The general University guideline for sick leave is 1 day per month. Vacation time varies with appointment; 1 day per month for research staff and 2 for faculty. Most faculty advisors find that they do not use all of the allotted 2 vacations days per month or their sick leave. Graduate students should have a similar expectation.

The student should discuss the expectations for total hours of work as well as the days of service (weekends/holidays) with their dissertation advisor. These expectations are likely to vary between laboratories so it is important to establish what these are upon entry into a laboratory. The student should be aware that these decisions are made in the best interest and safety of the student and for the efficient conduct of the experiments. ***Student should be aware that the degree is granted based on completion of the dissertation research and not based on length of time in the program.***

If the student is sick for a journal club, class or seminar, they should inform the faculty member in charge prior to that activity. The student should not assume that informing their advisor or course director of an absence will result in the communication of that information to other faculty. Each faculty member with whom the student has a class or other obligation must be informed individually.

The WVU Health Science Center has a defined policy to deal with extended periods of time away from the laboratory or class, generally greater than two weeks. This is termed a leave of absence and may be taken due to grave illness, pregnancy or family crisis. This policy can be found [HERE](#) and should be consulted when considering such leave. In some circumstances, the leave may be imposed upon the student administratively due to academic issues or policy violations. The procedure for administrative leave is described in this policy. Click [HERE](#) to download the form for requesting extended leave.

A.9. Changing Mentors

Students may need to change mentors in the course of completing their dissertation research. The protocol for accomplishing this task varies depending on the reason:

1. *The mentor has left WVU, and the student is remaining at WVU.* The student should immediately meet with the BMB Graduate Program Director(s) and set up a plan based on whether the student will continue on the same project and/or if the mentor will remain involved in the dissertation research after he or she leaves the University. In either situation,

the student should have another faculty member serve as a WVU on-site advisor. In addition, the student should move their research activities to the on-site advisor's laboratory or another faculty member's laboratory conducting similar research.

2. *The student is not getting along with their mentor.* Student displeasure with their laboratory and/or mentor does not necessarily mean that the student will need to leave the laboratory. ***The key to handling this situation effectively is for the student to act quickly after sensing a problem.*** First, the student should discuss with the mentor what is troubling them. The mentor may not realize that the student has a problem. The mentor may be willing to work with the student in developing a solution. The student should consider that they may be expecting the mentor to fill too many roles and that additional mentors may be helpful for concerns that are less "research based". Second, if talking with the mentor or spreading mentoring roles to other individuals does not solve the problem, the student should discuss the issue with one or both of the Biochemistry and Molecular Biology Graduate Program Directors. Third, if continuing in the mentor's laboratory is not an option, the student will need to consult with the Biochemistry and Molecular Biology Graduate Program Directors and the Assistant Vice President for Graduate Education to identify a new mentor. Fourth, candidate mentors will need to be interviewed to determine their willingness to accept a new student. In addition, there will be a trial period to establish whether the new laboratory is a good fit. This trial period should be at least two weeks but not longer than a month. Fifth, once the student finds a new mentor, they will need to re-do their committee approval form. This will indicate the new mentor and will ensure that the committee is appropriate for the new project. If the timing is such that the student is delayed in completing the candidacy exam, they will need to petition the Biochemistry and Molecular Biology director(s), the students advisory committee, and the Assistant Vice President for Graduate Education for an extension.

B. Academic and Professional Standards

B.1. Grades

It is expected that students will perform satisfactorily on all required courses. To remain in good standing in the Ph.D. program a student is required to maintain the following standards:

- a. An overall grade point average of 3.0 in graduate level coursework excluding research credits.
- b. No grade less than a C in all course work. Students receiving a grade lower than a C will need to repeat that course. During the first year curriculum, Students should receive no less than a B in Foundations of Contemporary Biomedical Research 1 & 2 (BMS 793A and 793B) and Molecular Biology (BMS 715). Students receiving a grade lower than a B may need to repeat that course or remediate a portion of the course.

- c. An incomplete grade must be removed within one semester or summer session of their posting, unless special permission is granted by the graduate program director(s) in consultation with the student advisory committee.
- d. Satisfactory performance in research (BIOC 797). A grade of U must be accompanied by written comments describing the rationale for the grade. Receiving a U puts the student on academic probation. The student must have a committee meeting within the semester or summer session following the receipt of a U to discuss ways to remediate the problems. Two U's will be grounds for dismissal from the program.
- e. Grading of courses during a leave of absence will be handled on a case by case basis. For defined didactic courses, the student will generally need to take an incomplete grade and work with the instructor to develop a strategy to complete the class. In the case of research (BIOC 797), the student should withdraw from the course before the deadline, as there is no mechanism to fulfill an incomplete grade. If the deadline for withdrawing from the class has passed, the student will receive a grade (S/U) reflecting their participation prior to the leave of absence. Missed journal club sessions in BIOC 785 will be handled by having the student complete and submit answers to the 4-question exam on the missed paper(s). Students should contact course coordinators to arrange how work will be handled during the leave of absence.

Failure to comply with these standards will result in the student being placed on academic probation and may result in dismissal from the graduate program.

B.2. Evaluation of the Student's Progress

The progress of each student will be reviewed at least once a year by the student's advisory committee. Following the committee meeting, the committee chair (usually the student's advisor) will prepare the [Advisory Committee Meeting Evaluation Form](#) documenting the progress of the student as evaluated by the advisory committee. This form should include written accolades or concerns by the advisor and the committee. ***After entering their second year, the student's progress and goals will be evaluated at least once a year by the student's advisory committee (see Section C3).***

All graduate students at the WVU Health Sciences Center are required to carry out an Individual Development Plan (IDP) self-evaluation annually. IDP self-evaluation is required for students supported by NIH, NSF, and many training fellowships. Information on IDP can be found at the following link: <https://www.hsc.wvu.edu/resoff/graduate-education/policies-and-forms/forms/>

Please note that unique IDP forms are filed at different stages of the Ph.D. program. As the student progresses, some questions in the IDP are intended to help facilitate discussion between the student and mentor about career path opportunities and expected thesis defense timelines.

The Biochemistry and Molecular Biology director(s) and the chair of the student's advisory committee will monitor that program requirements are being met in a timely fashion. When

a student is overdue for the completion of a requirement, the committee will first contact the advisor. Failure to complete the requirement within a reasonable time thereafter may result in action by the committee.

B.3. Student Code of Academic and Professional Integrity

Developing and practicing high standards for professional conduct are critical for the scientist. Both the University Graduate Council and the Graduate Faculty consider maintaining scientific integrity to be of utmost importance. All students are required to take a course in scientific ethics as part of the integrated first year curriculum. These standards are to be adhered to throughout the student's graduate education and into his or her career. All students are directed to be familiar with the University's policy on this subject. This can be found at:

[http://catalog.wvu.edu/graduate/enrollmentandregistration/ - Integrity and Dishonesty](http://catalog.wvu.edu/graduate/enrollmentandregistration/- Integrity_and_Dishonesty)

Students should pay particular attention to the avoidance of plagiarism in all scientific writing. The University's definition and position on plagiarism is: "Plagiarism is defined in terms of proscribed acts. Students are expected to understand that such practices constitute academic dishonesty regardless of motive. Those who deny deceitful intent, claim not to have known that the act constituted plagiarism, or maintain that what they did was inadvertent are nevertheless subject to penalties when plagiarism has been confirmed. Plagiarism includes, but is not limited to: submitting, without appropriate acknowledgement, a report, notebook, speech, outline, theme, thesis, dissertation, or other written, visual, or oral material that has been copied in whole or in part from the work of others, whether such source is published or not, including (but not limited to) another individual's academic composition, compilation, or other product, or commercially prepared paper."

(from: [http://catalog.wvu.edu/graduate/enrollmentandregistration/ - academicdishonestytext](http://catalog.wvu.edu/graduate/enrollmentandregistration/- academicdishonestytext))

Students who have any questions regarding what constitutes plagiarism should request clarification from the faculty before embarking on any writing assignment. Failure to adhere to these standards of scientific integrity will result in disciplinary action by the graduate faculty and may jeopardize the student's status in the graduate program.

B.4. Appeals Policy

Students may appeal any academic penalty or sanction imposed by an instructor, the institution or its constituent academic units, as prescribed in the "Academic Rights, Penalties and Appeal Procedures" section of the WVU Graduate Catalog. Students should consult the following link if they want to appeal an academic penalty or grade:

[http://catalog.wvu.edu/graduate/enrollmentandregistration/ - appealstext](http://catalog.wvu.edu/graduate/enrollmentandregistration/- appealstext)

C. Ph.D. Candidacy and Dissertation

A doctoral student is admitted to candidacy by successfully completing a qualifying examination and dissertation proposal defense. ***The expectation is that students complete their Ph.D. by the end of the 5th year of study.*** See section C.7 for more details.

C.1. Qualifying Examination

A written qualifying examination is given during the first week of August prior to beginning of the second year of graduate study.

The purpose of the qualifying examination is to assess the student's general knowledge of biochemistry and molecular biology. The exam consists of questions in each of the general areas of biochemistry and molecular biology including protein structure and function, enzymology, intermediary metabolism, molecular biology and genetics, cell structure and function, and signal transduction. An examination committee comprised of five faculty members from the BMB program will prepare questions on each topic and will provide a guideline for how long an answer should be. The student will have one week to write essay answers to the questions. The exam will be completed in an open book format, in the student's own words, and without consultation with other students. The examination committee will meet with the student within one week after completion of the exam to discuss the answers. Each examination area will be graded as 1) pass, 2) fail or 3) remediation as recommended. Students must pass all five areas of the exam to continue in the Ph.D. program. Failure to pass any area of the initial exam or remediation attempt will result in dismissal of the student from the Ph.D. program. Alternatively, depending on the extent of the deficiencies of the qualifying exam performance, the examination committee may recommend that the student be allowed to continue in the Master's of Science program in the Biomedical Sciences. The examination committee will provide a written summary of the exam performance for the student's file. ***In addition, the student will submit the [Doctoral Preliminary Examination Form](#) to the Health Sciences Center Graduate Programs Office.*** This form should be filed no later than October 1st of the students 2nd year.

C.2. Student Advisory Committee

A student advisory committee will be ***chosen at the beginning of the second year of study*** to evaluate the student's progress in research, to provide a sounding board for problems encountered or progress made, and to examine the student during the proposal and dissertation defense seminars (see below). The members of this committee will be selected by the major professor and the student.

The committee will consist of five members: three must be on the faculty of the Biochemistry and Molecular Biology Graduate Program, including the student's mentor who will act as chair, one must be a faculty member from another program (including adjunct faculty) within the University, and the fifth member can be either from within the Biochemistry and Molecular Biology Graduate Program or from another graduate program.

Selection of each committee member will be based on the nature of the research to be carried out and on the student's interests. The composition of the student advisory committee is subject to final approval by one of the Biochemistry and Molecular Biology Graduate Program Directors.

A [Committee Approval Form](#) should be sent to the Health Sciences Center Graduate Programs Office. All of the student advisory committee members must be present for the proposal defense and the dissertation defense. One member may be absent for other meetings, but this should be avoided if possible.

The first meeting with the advisory committee should occur during the Fall, or early Spring, semester of the student's second year. ***During this initial meeting the student will present their research project and preliminary progress. The student should also present their intended plan of study to their advisory committee at this time.*** This initial meeting will allow the advisory committee to comment on the scope and direction of the intended project to help ensure a successful proposal defense. After this first meeting an [Advisory Committee Evaluation Form](#) and the approved [Plan of Study Form](#) should be submitted.

The second advisory meeting will immediately follow the student's research proposal seminar. During this meeting, the student will present a progress report of their research findings since the last committee meeting and discuss plans for future experimentation. The advisory committee will provide criticism and suggestions to help move the project forward. They may also examine the student in broad areas of Biochemistry and Molecular Biology including an understanding of the techniques used in the proposal and the student's ability to use deductive reasoning. The student's advisor will prepare a written critique of each advisory committee meeting using the [Advisory Committee Evaluation Form](#). The completed evaluation form is signed by the committee members and placed in the student's file. Upon successful defense of their thesis proposal students must also file a [Doctoral Proposal Defense Form](#).

Following successful completion of the proposal defense and admission to candidacy, ***the student is required to meet with their advisory committee at least once a year*** to evaluate progress on the goals of the proposed research.

The format of the Advisory Committee Evaluation Form is similar to that of a progress report for a NIH grant. There is a brief introduction to the project followed by the specific aims. Under each aim, the completed experiments are listed, the conclusions drawn from those experiments are documented, and future plans are discussed. If nothing has been accomplished under an aim or if the aim is complete, this can be stated in a single sentence.

C.3. Dissertation proposal defense

The purpose of the proposal defense is to evaluate whether the student is prepared to undertake doctoral research. It consists of two parts: 1) a written proposal of the dissertation research project and 2) an oral presentation and defense of the project to the student's advisory committee and the BMB Faculty.

In the student's third year their dissertation proposal seminar may be used to fulfill the Research Forum presentation requirement, if their advisor agrees.

The format of the written proposal is the same as that of a NIH F31 predoctoral fellowship. Information and directions on how to prepare a F31 application can be found at: <https://researchtraining.nih.gov/programs/fellowships/F31>. The Office of Research and Graduate Studies has also developed a guide on how to prepare a F31 application. This information can be accessed through SOLE under Health Sciences Center Graduate Programs. The content section of this site contains a folder entitled "Information for Fellowship Applications". The format of the NIH predoctoral fellowship application is very similar to that of other funding organizations such as the American Heart Association (AHA).

The following sections must be included in the written dissertation proposal:

1. Abstract and narrative
2. Table of contents
3. Biographical sketch. To download form, click [HERE](#).
4. Specific aims – should contain at least 2 aims - 1 page limit
It is understood that these aims may change over the course of the research just as they do for the mentor's grants. A preference is for more aims rather than less to demonstrate the scope and potential of the project. Students commonly revise their proposals during the course of their dissertation research. Thus, it is not necessary for students to have a complete set of preliminary data supporting the aims of the proposal.
5. Research Strategy - 6 page limit
Each Aim should contain the following sections:
 1. Rationale
 2. Experimental plan and specific methods as appropriate
 3. Expected results
 4. Alternative approaches
6. Literature cited (no page limit)

Note: The page limits are for single spaced type. The allowed fonts are Arial, Helvetica, Palatine Linotype or Georgia and a font size of 11 or 12 points. The type density should be no more than 15 characters per inch and six lines per inch. One-half inch margins should be used on all sides but not greater than 1 inch. The page limitations of the proposal will be strictly enforced.

The student should consult with their advisor in determining the aims of the project. The student should also consult with their advisor on writing style and grantsmanship issues. During the summer semester of the second year of study, students take a scientific writing course (BMS 720) where one of the class projects is to prepare a predoctoral fellowship application in consultation with their advisor. This class project could be student's dissertation proposal.

The student should provide their advisory committee with a copy of the written proposal at least two weeks before the oral defense to allow sufficient time for the committee to evaluate

the project. The student will present their proposal in a public seminar in front of their advisory committee and the BMB faculty. Following the seminar, the student will meet with their advisory committee to evaluate the proposal in depth. During this meeting, the advisory committee will be charged with examining the student in broad areas of biochemistry and molecular biology including an understanding of the techniques used in the proposal and the student's ability to use deductive reasoning. Following the proposal defense, the advisory committee will recommend that the student be 1) advanced to candidacy or 2) allowed to remediate deficiencies of the proposal defense. If the advisory committee recommends remediation of the proposal defense, this must be performed within two weeks of the original oral defense date. If the advisory committee judges that the proposal defense remains unsatisfactory after the remediation attempt, the committee will recommend that the student be dismissed from the Ph.D. program with or without the option of continuing in the Master's of Science program in the Biomedical Sciences.

The deadline for completing the proposal defense is November 1 of the third year of study.

In extenuating circumstances, such as a change of advisor, the student may petition the BMB graduate director(s) and the student's advisory committee to delay their proposal defense for a period not exceeding eight months.

Failure to defend the dissertation proposal by November 1st, or the end of the student's third year if granted a special exception, will result in dismissal from the Ph.D. program.

The format and timing of the proposal defense has been designed to facilitate the timely submission of predoctoral fellowship applications. Students typically submit AHA and NIH predoctoral fellowship applications during November and December of the third year of study, respectively. If the student chooses to submit a fellowship application, they will need to consult the directions for the additional sections required by the grant agency. In the case of the NIH F31 fellowship, these sections include Applicant's Background and Goals of Fellowship Training, Respective Contributions, Selection of Sponsor and Institution, Training in Responsible Conduct of Research, Sponsor and Co-sponsor Statements, Letters of Support, Institutional Environment and Commitment to Training, Vertebrate Animals, and Resource Sharing Plan.

C.4. Admission to Candidacy

Based upon the advisory committee's recommendation, with satisfactory performance on the written qualifying exam and proposal defense, the BMB Graduate Program Director(s) will recommend that the student be elevated to candidacy for the Ph.D. degree. The following forms must be filed before admission to candidacy:

- [Doctoral Qualifying Examination Form](#), which should be filed by October 1st of the 2nd year of study.
- [Plan of Study Form](#), which should be completed and submitted to the Graduate Programs Office after the students first committee meeting in their 2nd year of study. An example course schedule is provided on page 19-20.

- [Doctoral Proposal Defense Form](#), indicating successful completion of the oral exam. It is expected that the proposal defense will be completed by Nov 1st of the 3rd year of study.
- Students are responsible for timely submission of the Advisory Committee Meeting Evaluation Form. This form must be filled out after each committee meeting (including proposal defense).

C.5. Out of Area Seminar

After achieving candidacy, the student is required to present an out of area seminar. The student should register in BIOC 796 in the semester they intent to fulfill this requirement.

The student should choose a topic they are interested in that is ***unrelated to their thesis project***. After the student, advisor, and the BIOC 796 course director agree that the chosen topic is appropriate, the seminar may be scheduled. The out of area seminar is intended to provide the student with the opportunity to broaden their knowledge, and to demonstrate their ability to clearly present a topic outside of their immediate area of expertise.

The out of area seminar is graded as either S (satisfactory) or U (unsatisfactory) by the Department of Biochemistry Faculty. In the case of an unsatisfactory grade, the student must remediate the grade to satisfactory within one semester. The form of this remediation will be determined by the student's advisory committee.

After completion of the out of area seminar requirement the student may opt-out of the Molecular Biology Journal Club starting from the following semester. This is contingent upon the student and advisor agreeing that the student has gained sufficient experience in critical assessment of the literature.

C.6. Dissertation Preparation, Seminar, and Defense

When research has progressed to a point that is considered satisfactory by the major professor and the advisory committee, the student will write their doctoral dissertation according to Graduate Council guidelines. A copy of these guidelines can be obtained from the Health Sciences Graduate Programs Office. A draft of the dissertation will be approved by the student's advisor and the advisory committee before the final oral defense. This draft must be given to the committee members one month prior to the defense. Exceptions to this time schedule are strongly discouraged and will require the approval of every member of the advisory committee.

The student will not be allowed to defend their dissertation without a minimum of one paper in press in a peer-reviewed journal, in which the student is the first author.

Submission of the paper must be approved by the student's advisor. In some cases, students

share first authorship with another member of the laboratory. The use of such papers to fulfill this requirement will be at the discretion of the student's advisory committee.

The final examination for the Ph.D. degree will consist of presenting a dissertation seminar before the advisory committee, the Biochemistry and Molecular Biology Graduate Program, and any other interested parties, after which the student will continue with their dissertation defense in a separate session with their advisory committee.

A Shuttle Sheet Request Form (click [HERE](#) to download) must be submitted to the Health Sciences Graduate Programs Office two weeks prior to the defense date.

If performance in the oral defense is judged satisfactory by the advisory committee, the granting of the Ph.D. degree will be recommended. Following the satisfactory defense of the dissertation, the student must prepare the dissertation for electronic submission to the University (For instructions, click [HERE](#)). Approval of the written dissertation and the electronic submission, which includes signatures from all committee members, must be completed before the Ph.D. can be conferred. Students should not make firm commitments for start dates in postdoctoral positions or other employment prior to completion of these requirements. A checklist of requirements for graduation with a degree in Doctor of Philosophy at the WVU Health Sciences Center can be downloaded by clicking [HERE](#).

C.7. Deadline for completion of the degree

Students should complete their degree within 5 years of matriculating into graduate school provided they have demonstrated a strong work ethic in both academics and research.

Students have a maximum of 7 years to complete their PhD from entry into the biomedical first semester curriculum to defense of their dissertation and submission of the dissertation to the Electronic Thesis and Dissertation repository (ETD). For example, a student entering in the Fall of 2020 will need to complete all program requirements by the end of summer session in August of 2027.

Students who fail to complete the degree within this timeline will be recommended for a terminal MS in Biomedical Sciences Degree. In extraordinary circumstances, students can petition for an extension of the time to degree. This petition must be approved by both the graduate program director(s) and the Assistant Vice President for Graduate Education. Only one extension will be allowed and will not exceed 1 year.

These time limits include students who have switched laboratories, as 7 years is still 2 years longer than the recommended 5-year timeline.

Students entering their 6th year in graduate school must have committee meetings every 6 months in order to monitor progress. Failure to meet the committee meeting requirement may result in suspension of the student's stipend and tuition waiver until this requirement is met. Students who have a documented Leave of Absence can subtract the time during their leave of absence from the 7-year deadline.

D. M.D. / Ph.D. Students

1. Two years of the medical school curriculum will satisfy the first year course requirements. The medical school curriculum includes an introduction to statistics as part of the Evidence Based Medicine course.
2. Laboratory long rotations are chosen through the M.D./Ph.D. program and are completed prior to entry of the student into the Ph.D. portion of the curriculum.
3. Passing the national boards will satisfy the written qualifying examination requirement.
4. The oral qualifying exam will be the proposal defense and it will follow the guidelines for regular graduate students. It is recommended that this exam be taken during the first year of research but must be completed by the end of the fall semester of their third semester in the graduate program. Failure to pass the oral exam by the end of the third semester in the graduate program, unless prior approval is provided by the Graduate Studies Committee, will result in dismissal from the doctoral graduate program.
5. Other course work and seminar requirements are two advanced courses, journal clubs, three seminars, as required of other students in the Ph.D. program.
6. Students will take the course in scientific ethics taught by the Office of Research and Graduate Studies.

SAMPLE COURSE SCHEDULE
(Note: this may vary by student)
BIOCHEMISTRY AND MOLECULAR BIOLOGY
PH.D. PROGRAM

To retain full time student status and to qualify for the graduate tuition waiver, students must register for a minimum of 9 credit hours each regular semester and 3 credit hours during the full summer session (May to August).

For more information, see: <http://graduateeducation.wvu.edu/forms-procedures/academic-services-policies-and-procedures/summer-enrollment-guidelines>

<u>1st Year</u>	<u>Credit Hours</u>
Semester 1: Undifferentiated Curriculum	
Foundations of Contemporary Biomedical Research 1 & 2	8
Biomedical Research Methods	1
Scientific Integrity	1
Laboratory Rotations	2
Total	12
Student chooses laboratory to carry out dissertation research	
Semester 2: Molecular Genetics	3
Scientific Rigor & Ethics	1
Biochemistry and Molecular Biology Journal Club	1
Research	4
Total	9
Summer: Research	3
<i>Written Qualifying Exam the first week of August</i>	

<u>2nd Year</u>	
Semester 1: Advanced Course (e.g. Biochemical and Oncogenic Signaling)	3
Biochemistry and Molecular Biology Journal Club	1
Research	5
Total	9
Semester 2: Advanced Course (possibly Protein Structure and Enzymology or Advanced Molecular Biology offered on alternate years)	4
Biochemistry and Molecular Biology Journal Club	1
Research	4
Total	9
<i>Students should form their committees and have their first meeting completed by this time.</i>	

Summer:	Scientific Writing	2
	Research	<u>1</u>
	Total	3

Student writes dissertation proposal for **defense by Nov 1st**

3rd - 5th Year

Semester 1:	Biochemistry and Molecular Biology Journal Club	1
	Out of area seminar	1
	Research	<u>7</u>
	Total	9

By November 1 of the third year, the student must complete their dissertation proposal defense.

Semester 2:	Biochemistry and Molecular Biology Journal Club	1
	Research	<u>8</u>
	Total	9
Summer:	Research	3

- Experiential learning and out of area seminar requirements can be completed at any time after the student achieves candidacy.

The expectation of the BMB program is that students will complete their thesis defense by the end of their 5th year. The maximum time to degree is 7 years.

Signature Page

I have read and understand the Handbook of the Graduate Program in Biochemistry and Molecular Biology for the Ph.D. and M.S. degree programs. I agree to abide by the requirements outlined in this document as well as the University requirements governing these degrees.

Signature: _____

Name
(printed): _____

Date: _____

I pledge to adhere to the Student Code of Academic and Professional Integrity for the Ph.D. and M.S. degree programs (section B.3 of this handbook) and to maintain the highest standard of scientific integrity in all that I do.

Signature: _____

Name
(printed): _____

Date: _____

I agree to adhere to all Federal, State, and University policies and requirements for the conduct of work in the laboratory. I will remain up-to-date on all certifications for both laboratory conduct and the responsible conduct of research.

Signature: _____

Name
(printed): _____

Date: _____