

MOLECULAR MEDICINE QUALIFYING EXAMS 2023-2024

Student Information and Timeline

November 8, 2023

Attend exam overview meeting of students and their mentors with the Molecular Medicine Director and Track Leaders. *Students are responsible for advising mentors not in attendance of the information presented.*

PhD: December through March (2023-2024)

MD/PhD: May through July 2024

Prepare the 7-page ORIGINAL written proposal as the first part of the qualifying exam (see MMED guidelines for instructions). The **Qualifying Exam proposal** does not require preliminary data and must be developed by the student- with no input from the mentor or anyone else. The proposal can be related to the student's general area of research interest but must be a novel hypothesis that the student comes up with on from their own reading. The point is to test the student's ability to first identify an unmet need or question, develop a novel hypothesis, and plan a research approach and experiments to test the hypothesis, and to discuss possible outcomes of those experiments. This ability is required for the PhD degree and is what the student will be examined on by the Qualifying Exam Committee. It is important that the Qualifying Exam proposal is entirely the student's own work. The mentor and student respective contributions are declared during the oral exam.

WE REPEAT: *The Qualifying Exam proposal must be comprised of the student's original ideas and literature research performed by the student. It cannot be redacted from the PI's grants or from other student's qualifying exams. Mentors and other students should NOT provide original ideas for the proposal but may simply answer student 'yes/no' questions and provide suggestions for text editing and proposal organization.*

PhD: February 9, 2024

MD/PhD: June 7, 2024

SUBMIT to Track Leader: (i) a one-page PDF document containing the Title and Abstract of the proposal (including Hypothesis and Specific Aims), and (ii) a one-page PDF document listing all completed course work. The Track Leader will use this information to select the members of the Qualifying Examination Committee from the entire pool of GPILS faculty. (*Optional: you may suggest to your Track Leader 1-2 names of faculty who have knowledge of the research area of the proposal*).

PhD: March 8, 2024

MD/PhD: July 12, 2024

SUBMIT the final written proposal to your Track Leader as an electronic PDF document. A title page should be included that contains the following statement "I certify that this is my original work" with the student's signature. The Track Leader will NOT provide critical feedback on the written proposal. The Track Leader will distribute the proposal to the Qualifying Examination Committee members for assessment.

NOTE: Significant delay in submitting the written proposal may be considered as a failure in the first attempt of the oral examination.

Hint: If you have not already started to study for the oral examination, you should begin at this time.

PhD: April 1, 2024

MD/PhD: August 1, 2024

- If the written proposal is satisfactory, the student will be informed and provided with the composition of their Qualifying Examination Committee. The student must then proceed to contact each member to arrange the date, time, and location for the second phase of the examination, the Oral Exam.
- If the proposal is not satisfactory, the student will be notified of this outcome and must revise the written proposal for resubmission to the committee within 1 month, in accordance with written critical feedback. One revision is accepted.

Oral exams should be scheduled during April or May (or before) and must be completed by May 31st. MD/PhD Oral exams should be scheduled during August or September (or before) and must be completed by September 30th. Students are expected to take ~1 month to prepare for the oral qualifying exam.

The Oral Exam:

The Oral Exam will be conducted as described in the 'Qualifying Examination' guidelines. The mentor attends the Oral Examination but does not participate and does not vote.

Hint: 'Practice' oral exams are strongly recommended in preparation for the oral exam.

Guidelines for Qualifying Examinations

(from MMED Handbook)

The purpose of the qualifying examination is to test the student's readiness to make the transition from classroom training to thesis research. It consists of two parts: Part 1 is an original written research proposal in the format of an NRSA-style grant application. Part 2 is an oral examination in which students will be tested both on their foundation of knowledge in the field and their ability to orally defend their proposal.

Timing and Scheduling: Unless prior approval by the MMED COGS is obtained, Ph.D. students will take their Qualifying Examination in the spring semester of their second academic year, and no later than the end of their second year in the program. Ordinarily the Oral Exam part occurs in April or May of the second year. M.D./Ph.D. students will take their Qualifying exams before the end of their first academic year in the Program.

Examination Committee: A Qualifying Examination Committee for the student will be selected by the Track Leader and shall consist of five members of the GPILS Program faculty, plus the Dissertation Advisor (non-voting member). The Track Leader receives the proposal from the student, distributes it to the members of the Qualifying Examination Committee (and Program Director), and keeps the student informed of all subsequent decisions of the Committee. The student schedules the oral exam.

Review of the Research Proposal: The Qualifying Examination Committee will review the written proposal to determine whether it is satisfactory within two weeks of submission. If the written proposal is deemed defensible, the Track Leader will be notified by the examiners, and the student will be asked by the Track Leader to schedule an oral examination. If the written proposal is deemed not satisfactory, it will be returned with examiner's comments for guidance in rewriting. The timing and number of resubmissions allowed for this process will be at the discretion of the Track Leader with consultation and advice from the Qualifying Examination Committee. A maximum of one month will be allowed for any revisions. Program Director will be kept informed and provided with copies of the written comments.

Oral Examination: The purpose of the oral examination is to test the student's foundation of knowledge and the student's abilities to defend any aspects of the written proposal, including the student's abilities to evaluate the literature relevant to the research topic, to formulate original and testable hypotheses, to select appropriate methods, to design well-controlled experiments, and to interpret experimental data. Students will not give a preliminary presentation in the oral exam. The purpose of the oral examination is not to grade the research proposal *per se*, but to determine readiness of the student to engage in thesis research.

Each examiner, in order, will ask a line of questions within two rounds of examination (*Note to examiners:* please refrain from trying to explain or restate another examiner's question; the student should do that if needed). Students will be expected to demonstrate knowledge of general topics in Molecular Medicine, and topics that derive from their academic coursework as well as their research proposal, whether or not they are asked about them directly. Questions may include justification of the choice of the proposal problem, the methods to be used, what given results might mean, what might go wrong, and alternative approaches. The student should be prepared to utilize a white/black board to illustrate concepts during the examination. The objective is to detect and probe areas of weakness; thus, students should not expect

to be able to answer all that they are asked. The oral exam is as much a test of ability to “think on one’s feet” as of knowledge.

Students will be given ~10-15 minutes to answer the questions of a given examiner; the examiner may ask a second line of questions in the allotted time or pass to the next examiner. Other examiners may not answer any questions or provide substantive information to students during the examination. During the exam, the mentor/advisor is not allowed to ask questions or to comment. If a student is unable to answer a question to the examiner's satisfaction in that time period, the Chair will move on to the next examiner (who may choose to ask a related question or a question on a different subject). The exam will usually last 1-2 hours and is limited to **2.5 hours**. Thus, each examiner should be able to question the student at least twice during the exam.

At the end, the student will be asked to leave the room and the Qualifying Exam committee will discuss the exam with the mentor, who may act as an advocate for the student prior to the vote. In the absence of the student and the mentor, the Qualifying Exam committee will deliberate and decide the outcome by majority vote. The Qualifying Exam committee will determine whether (1) the student passes and is recommended for admission to candidacy, or (2) remedial actions are required. Remedial actions will include a defined written or oral remediation to make up deficiencies in knowledge as determined by the Qualifying Examination committee. The student and mentor will be informed of the committee's decision immediately after the examination. Any decision other than a pass will be accompanied with a written statement to the student and mentor within 48 hours outlining not only the reason for the decision, but also the requirements that should be met to achieve a pass. In the case of remedial actions, a second opportunity to pass the Qualifying Exam will be available. In the case of a minor perceived deficiency, the student will be asked to submit a written mini-review or other written report to correct the deficiency. Normally up to one month will be allowed to complete this assignment. In the case of a major deficiency or multiple perceived deficiencies, the student will be allowed one opportunity to retake the oral examination. The second oral examination will be conducted by the original Qualifying Examination Committee as soon as possible. Normally one month, up to a maximum of three months, will be allowed to prepare for a second oral exam. A failure of the Qualifying Examination shall be considered grounds for dismissal from the Program.

A Qualifying Examination Form (**Appendix 5**) should be completed during each stage of the process, appended with correspondence pertaining to any remedial actions, signatures obtained, and the original document(s) submitted to the Molecular Medicine Academic Services Specialist.

Instructions for the Written Research Proposal

1. The research proposal must be an original work of the student. Students are permitted to seek advice and consult their advisor or other experts, but the proposal must be the student's own. The student will certify the proposal as his or her own work on the cover page.
2. Read and follow the instructions carefully to avoid delays and misunderstandings. In preparing the application, avoid jargon; not all examiners will be familiar with your specific area of research. For terms not universally known, spell them out the first time it is used, with the appropriate abbreviation in parentheses; the abbreviation may be used thereafter. Define all terms. Remember that it is your job to make your proposal clear and comprehensible to the examiners. They should not be expected to do background preparation for the examination.
3. The maximum length of the proposal is 7 pages, not including the Title Page or the Literature Cited. All tables, graphs, figures, diagrams, and charts must be included within the 7-page limit. Prepare the application single-sided and single spaced, staying within 0.5-inch margins. The print must be clear and legible. Use a standard font (Arial, Times, Courier, Helvetica) and a minimum size of 11 point.
4. The proposal must contain the following sections:

A. Title, Abstract and Certification Page: The first page of the application is the title page with your name, affiliation, and lab/mentor name. Please keep the title brief and to the point. The statement 'I certify that this is my original work' and your signature must be on the title page. The abstract should summarize the proposal in less than 350 words on the same page. (This page does not count towards the 7-page limit).

B. Specific Aims (1 page): An introductory paragraph should introduce the grant, followed by clearly stated the goals of the proposed research and a summary of the expected outcome(s), including the impact that the results of the proposed research will exert on the research field(s) involved. State the hypotheses to be tested and/or the question that is to be answered clearly. List the specific aims and summarize your experimental approach for achieving each aim. **There should be no more than two Specific Aims.**

[**Tip:** Top-notch research proposals are driven by strong hypotheses. Think of your hypothesis as the foundation of your application -- the conceptual underpinning on which the entire structure rests. Generally, applications should ask questions that prove or disprove a hypothesis, challenge an existing paradigm, or address a critical barrier to progress in the field, rather than use a method to search for a problem or simply collect information.]

C. Research Strategy (6-page limit): Organize the Research Strategy in the specified order using the instructions provided below. Start each section with the appropriate section heading—Significance, Innovation, Approach.

- (a) **Significance-** Put the significance of your research in the context of 1) the state of your field and 2) the long-term research goals. You may want to address one or several of the following if appropriate:
- Explain the importance of the problem or critical barrier to progress in the field that the proposed project addresses.
 - Explain how the proposed project will improve scientific knowledge, technical capability, and/or clinical practice in one or more broad fields.

- Describe how the concepts, methods, technologies, treatments, services, or preventative interventions that drive this field will be changed if the proposed aims are achieved.

[Tip: This section will require a thorough knowledge of the relevant literature and the ability to critically evaluate existing knowledge to identify the relevant gaps, roadblocks and opportunities in the field. You should demonstrate familiarity with the field and knowledge about the research being done, referring to relevant scientific literature. If you leave out an important work, reviewers will assume you are not aware of it. State concisely the importance and biomedical/health relevance of the research by relating the specific aims to the broad, long-term objectives. Why is the work important? What has already been done? How is it significant?]

(b) Innovation – Explain how the work is new and unique and how it will add significantly to what's known. You may want to address one or several of the following if appropriate:

- Explain how the application challenges and seeks to shift current research or clinical practice paradigms. If your proposal challenges an existing paradigm, you'll need to build a strong case for your ability to challenge the existing paradigm and your reason for doing so.
- Explain how the proposed project will improve scientific knowledge, technical capability, and/or clinical practice in one or more broad fields.
- Describe how the concepts, approaches or methodologies, technologies, treatments, services, or interventions that drive this field will be changed if the proposed aims are achieved.

(c) Approach

For each Specific Aim of the project, describe the overall strategy, methodology, and analyses to be used to accomplish the aim.

- Under strategy explain what you want to do and why. This section may include data only if you want to and have data to include. Data is not required; examiners are aware that you have only been in the laboratory a short time. If you do include data, keep in mind that the primary purpose of this section is to provide experimental support for the hypotheses to be tested and to demonstrate the technical feasibility of the project.
- Under methodology explain how you are going to do the proposed work. Include sufficient information for a full evaluation of the project, independent of other documents. Be specific and informative and avoid redundancies. Be sure to mention, where appropriate, which statistical methods you plan to use.
- Under expected results, discuss what results you anticipate and what your interpretations will be if you do or do not obtain those results. (see Hints, below).
- Under Possible pitfalls and alternate methods, discuss potential problems, alternative strategies, and benchmarks for success anticipated to achieve the aims.

D. Literature Cited (no page limit): List all references that are relevant to your proposed work. Each reference must include the title, names of authors, book or journal, year of publication, volume number, and page numbers. Use this opportunity to gain experience using reference database software such as *Reference Manager* or *Endnote*. In addition, highlight the 5 references that are most central to your proposal. These should be the papers that form the theoretical and methodological foundation upon which your proposal rests (choose carefully: your ability to identify these papers will in part indicate your understanding of the field). Examiners may test your understanding of these papers, both their strengths and weaknesses, as part of the exam.

Hints: The following is an abbreviated checklist from the NIH for suggestions about the Research Design and Methodology.

General

- Does each experiment correspond to one of the specific aims, and are they stated in the same order?
- Do the experiments follow a logical sequence?
- Did I use flow charts and decision trees to show paths of experiments and how they will progress?
- Have I included sufficient detail to show I understand and can handle the research?
- Have I only included information that is needed to state my case, i.e., have I avoided including anything I don't plan to do?
- Have I cited references wherever possible?

Approach

- Did I state the expected outcome of my research?
- Did I list each set of experiments in the same order as my specific aims, linking my experiments to the aims?
- Are the methods I chose appropriate to achieve the specific aims?
- Did I show why each experiment is important or how it is relevant to the hypothesis?
- Are the experiments in a logical sequence, flowing from one to another with clear end points?
- Will reviewers think I am knowledgeable about my methods?
- Did I justify my choice of methods in detail?
- Did I outline my methods in detail?
- Did I support my methods with data/references?
- Did I provide solutions for potential problems?
- Is my proposed model system appropriate?
- Did I address difficulties I may encounter with the proposed approaches, show I can handle them, and propose solutions and alternatives?
- Did I consider how the limitations of the approaches may affect my results and data?
- Did I address possible problems and limitations of the procedures, and propose solutions?
- Did I estimate how much I expect to accomplish each year of the grant and state any potential delays?
- Did I use enough detail?
- Did I include all relevant controls?
- Did I anticipate reviewers' questions about the feasibility of what I propose, e.g., how I will gain access to reagents, equipment, or study populations?

Results

- Did I show I am aware of the limits to and value of the kinds of results I expect?
- Have I convinced the reviewers that I will be able to interpret my results?
- Are statistical methods used appropriately?
- Did I define the criteria for evaluating the success or failure of a specific test?
- Did I state the conditions under which my experimental data would support or contradict my hypothesis?
- Did I state the limits I will observe in interpreting results?

**MOLECULAR MEDICINE Ph.D. PROGRAM
Qualifying Examination Form**

Student name:
Current GPA:
Total credit hours:
Research Track:

Mentor name:
Primary appointment department:
Graduate Faculty status:

I. Grant Writing Component

Date submitted to track leader:

The written proposal must be an original, satisfactorily written research proposal in the form of a NRSA grant application as per Molecular Medicine Program guidelines. (If the first written proposal was not satisfactory, the student was provided with written guidance (comments attached) and allowed a maximum of one month to revise).

- Satisfactory proposal. Schedule oral exam.**
- Revision required and must be submitted by the following date:**
- Revised proposal deemed satisfactory. Schedule oral exam.**
- Revised proposal deemed unsatisfactory. See program director.**

Track Leader signature: _____ Date: _____

II. Oral Component

Date of exam:

- Pass**
- Minor deficiency** in one aspect of knowledge, hypothesis testing or other. Remedial action required by the following date:
(Details regarding form of remedial action to be taken must be attached).
- Retake** oral comprehensive exam by the following date:
(Reason for this decision and outline of requirements to be met must be attached. Exam must be re-taken within 1-3 months.)

III. Remedial Exam

Date of exam:

- Pass
- Fail

Examination Committee Members

Member names	Member signatures
Chair:	
Member 1:	
Member 2:	
Member 3:	
Member 4:	
Mentor:	

Track Leader signature: _____ Date: _____

Program Director signature: _____ Date: _____

Application for Admission to PhD Candidacy

- Read the requirements for the Doctor of Philosophy degree in the Graduate School catalog
- Familiarize yourself with the specific PhD requirements established by your program
- Complete this application
- Obtain approval signatures from your primary adviser and graduate program director
- Attach your unofficial transcript printed from [SURFS](#) to this application; cross out courses that will not count toward this PhD degree
- Submit this application and transcript to: gradforms@umaryland.edu or Graduate School Dean's Office, 620. W. Lexington St.,

Last Name:	Title <input type="checkbox"/> Mr. <input type="checkbox"/> Ms. <input type="checkbox"/> No Title	First Name
Student ID Number: @	E-mail address:	
Mailing Address: Street		
City	State	ZIP
Graduate Program:	Date admitted to Graduate Program:	
Number of credits earned toward this PhD Degree (not including 899):	List course(s) in which a incomplete (I) or no mark (NM) was earned:	
List course(s) earned at other institutions which will count towards this PhD degree (grade earned must be ≥B, attach official transcript):		

APPROVAL SIGNATURES

Please type and sign

Thesis Adviser:	Signature: Graduate Faculty Status: Regular <input type="checkbox"/> Associate <input type="checkbox"/> Special <input type="checkbox"/>	Date:
Graduate Program Director: Dr. Toni M. Antalis	Signature:	Date:
Graduate School Associate Dean: Dr. Erin Golembewski	Submit application to Graduate School Dean's Office for Signature:	Date: