

THE QUALIFYING EXAMINATION Student Guidelines

For the Advancement to Candidacy for the PhD Degree

Candidates for the PhD degree must satisfactorily complete a *Qualifying Examination*, the purpose of which is to ensure that students have a general understanding of the biomedical sciences and sufficient knowledge of their chosen area of thesis research to proceed towards the PhD degree in a timely manner. The Graduate Division administers the Qualifying Examination in the fall/spring of each year. The examination is usually taken in the second year of the PhD program (or in the third year of the MD-PhD program). Under extenuating circumstances, a student may defer the examination with permission of the Associate Dean for Graduate Programs, based on gaps in his/her academic training, illness, a change in laboratory, or other extenuating circumstances.

It is expected that students will have completed *most* of their program-specific and department-specific course requirements prior to taking the Qualifying Examination. Successful completion of the examination marks a student's transition to the independent research phase of his/her graduate training.

The Mission of the Qualifying Examination

Advancement to candidacy by passage of the Qualifying Examination reflects the judgment of the Graduate Division faculty that a student is adequately prepared to embark upon focused thesis research. That is, the student has demonstrated the fundamental knowledge in a chosen discipline and the creativity, discipline, and dedication to complete the PhD degree in a timely manner. Conversely, failure of the examination indicates faculty concern regarding the student's likelihood of success at conducting PhD-level independent research.

The Responsibilities of the Candidate

A student who seeks to advance to candidacy for the PhD degree must take *full responsibility* for preparation for the examination. Each student should use the planned thesis research as the starting point for Qualifying Examination preparation. For the Qualifying Exam, the student is expected to:

- be scientifically conversant in their chosen discipline,
- demonstrate creative and critical thinking about their proposed studies,
- adhere to the highest standards of intellectual and professional integrity.

During the exam, the student must:

- demonstrate an understanding of the underlying principles and context of the proposed work,
- demonstrate scientific depth and breadth of understanding of the field.

Successful completion of the exam indicates that the student is ready to embark on his/her academic journey toward the doctoral degree.

The Responsibilities of the Mentor

The mentor is very important in a graduate student's training. In preparation for the Qualifying Exam, the mentor:

- will work with the student to help the student develop an understanding of the field and relevant literature,
- will work with the student to articulate mutually agreeable (scientific) specific aims and provide guidance and recommendations on the development of the experimental approach,
- must read the student's written proposal, and

- may provide feedback on the written proposal, but should not write any part of the proposal.

Mentors must remember that the student is responsible for the crafting of a document that speaks in her or his voice. Mentors must understand that *it is not their ideas that are being examined*, but the student's understanding of these scientific ideas and the student's potential to conduct the proposed studies.

The Responsibilities of the Qualifying Examination Committee

It is the responsibility of each specific Qualifying Examination Committee to decide whether it is in the best interests of the student, the laboratory, and the PhD program for the student to embark upon a course of thesis study. The successful completion of a PhD dissertation requires substantial commitment, time and resources on the part of the student *as well as* the mentor, faculty and institution. The examining faculty must balance the following criteria in rendering judgment on whether the examinee will be admitted to candidacy:

- i. A student is expected to be conversant in their chosen area of scholarship including, but not limited to, their thesis project. The student may be examined on their understanding of topics covered in the graduate coursework, aspects of their specific field of study, as well as the principles and practice of techniques included in the Qualifying Examination proposal.
- ii. The examiners must judge the extent to which the written document is the student's work and weigh their evaluation of it accordingly.
- iii. The key responsibility of the examination committee is to judge whether the student's written Qualifying Examination proposal and the oral defense of it demonstrate critical thinking and creative approaches to the proposed studies.

In summary, the examination committee must decide whether to welcome the student through the gateway to the PhD, hold the student for reconsideration by failing them on the first examination or close the door and direct them to another professional endeavor by failing them on the second examination.

Composition of the Examination Committee

A *Qualifying Examination Steering Committee (QESC)* organizes each year's Qualifying Examinations. The QESC is composed of faculty representatives from the *Basic Science Departments* and the *Institute for Clinical and Translational Research (ICTR)* and is chaired by a committee member appointed by the Associate Dean for Graduate Programs. The number of department representatives to the QESC varies to avoid student/mentor conflict of interest and depends on the number of students taking the examination in a given year.

At an announced date (see Timeline), each eligible student, in consultation with the mentor(s), submits a list of four to eight faculty members whose expertise and interests the student feels would be appropriate to their area of study. The *Steering Committee* will use the student's list as much as possible to assemble the Examination Committee. The student's Qualifying Examination Committee includes:

- Four faculty from the above referenced departments.
- A department representative from the QESC who serves as the examination committee chairperson. Occasionally, due to conflicts of interest, faculty availability, etc., the chairperson may be a faculty member who is not currently sitting on the QESC. The chairperson will approve the proposed Qualifying Exam Committee(s) on which they have been selected to chair.
- Examining Committees typically include at least two members of the student's home department. Appropriate faculty from related programmatic areas may substitute for a departmental representative
- Mentors, co-mentors and/or associate mentors may *not* serve on their student's examination committee *nor* are they present during the oral examination. If a student has formed a Student Advisory Committee (SAC) prior to the examination, a member of their SAC may not serve on the student's Qualifying Exam Committee.

Scheduling of the Examination

Each student is responsible for scheduling the date, time and location for their *Qualifying Examination*. The examination will be scheduled within the designated 4-6 week period following the deadline for submission of the written proposal (see Timeline). Examinations may not be scheduled during official program holidays, as indicated on the Graduate Division academic calendar.

The student must submit to the Graduate Division office the form stating the scheduled date/time/location of their oral exam. *The Graduate Division office must be notified (via email: sgregistrar@einstein.yu.edu) of any subsequent changes to the date, time, and location of the oral exam.*

If a student has a meeting with their Student Advisory Committee (SAC) prior to the examination, this meeting must be held no less than one month prior to the scheduled date of the oral examination.

Four examiners must be present at the oral examination. If a member is absent, the committee chairperson is responsible for identifying and contacting an alternate. If more than one examiner is absent, the examination must be rescheduled for the earliest possible date.

Delaying the Exam

Special circumstances may justify delaying the date of the *Qualifying Examination*. A student may request a delay from the Associate Dean for Graduate Programs at the onset of the scheduling process. Alternatively, if a committee chairperson concludes that completion of a graduate course is essential to the student's preparation for the examination, the chairperson may request a delay from the Associate Dean, until the student completes the course.

Preparation for the Qualifying Examination

Each student's preparation for the *Qualifying Examination* can be roughly divided into three parts.

- *First* is achieving an understanding of the chosen area of thesis study through review of their completed course work, reading contemporary literature and discussion with faculty and peers. During the examination, the student may be asked to provide a five-minute critical summary of the last paper he/she has read in their field or the most recent paper from their laboratory.
- *Second* is preparing a clear and compelling written proposal that will provide the examination committee with a springboard for their exploration of the student's understanding of the chosen area of thesis research.
- *Third* is becoming adept at "thinking on one's feet" in preparation for the questioning of the oral examination. As discussed in more detail below, *examiners are more interested in a student's understanding of the concepts, assumptions and limitations of their proposal than in the granular detail of routine experimental techniques.*

Each student is responsible for the *first* part of his or her preparation. The Graduate Division has developed workshops, resources and guidelines to direct students through the *second* and *third* parts of their preparation. The workshops are summarized below.

Workshops

- Introduction to the Qualifying Examination* – An overview of the *Qualifying Examination* process and requirements.
- Proper Reference Citation: How to Avoid Plagiarism and Other Questionable Writing Practices* – Proper citation is an essential part of the responsible conduct and reporting of research. *Attendance and registration at this workshop is mandatory.*
- Preparing the Qualifying Exam Proposal* – This is a mandatory "nuts and bolts" course that focuses on crafting a written proposal. Topics to be covered include: determining the scope of the proposal, presenting the necessary background and significance, drafting specific aims and presenting a compelling research plan. *All students are required to take the course* and are therefore pre-registered. Students must attend all sessions of the course. A complete schedule of the course and course guidelines will be distributed

separately.

- iv) *Qualifying Examination Oral Format and Sample Questions* – This workshop focuses on the oral defense of the written proposal. Tips are provided on how to prepare for and answer the topic-specific and general questions asked by the examiners.

“Mock” Qualifying Examinations

Students are advised to participate in mock examinations, particularly with senior graduate students and post-doctoral researchers with expertise within and outside their area of thesis study. Mentors, co-mentors and examiners may not participate in mock examinations. Mock examinations are self-organized by students.

Writing the Proposal

A clear and compelling written proposal has a very positive impact on the oral examination; *students are reminded that they will be evaluated primarily on their defense of the proposal, not on the proposal itself*. Each student submits a written proposal based on their developing dissertation project. The proposal format is based on the format of an NIH NRSA fellowship application (Form PHS 416-1; OMB # 0925-0001). The format of the *Qualifying Examination* is presented in detail below. Basing the examination on the NRSA format is intended to give students a head start in preparing an application for extramural support.

The written proposal must be the work of the student. Mentors are encouraged to provide feedback about the aims, concepts and experiments included in the proposal but are prohibited from writing text for the student. It is expected that the student will seek editorial assistance from others. *A student may not copy or adopt any unpublished writings by their mentor(s), particularly grant proposals*. Discussion with mentors should certainly occur before writing starts and is permitted throughout preparation of the written proposal. Mentors are expected to conduct themselves in accord with the guidelines outlined in the mission statement at the beginning of this document. Students are encouraged to seek input and advice from other sources including fellow students, post- doctoral researchers, faculty members not affiliated with their examination and scholars outside of the Einstein community.

Qualifying Exam Proposal Format

Please read the following section carefully before crafting your proposal, as the format for the examination proposal is based on, but not identical to, the NIH NRSA fellowship application. Proposals that do not adhere to the specifications listed below will be returned without review.

- **Length, Paper Size and Title Page:** The proposal will be 18 pages *excluding* a title page and the Literature Cited, using standard 8.5” x 11” paper with 1-inch margins. The title page lists the proposal title and the student’s name, mentor and department.
- **Font and Line Spacing:** Use an *Arial, Helvetica, Palatino Linotype, Times New Roman* or *Georgia* typeface, a *black font color*, and a *font size of 11 or 12 points*. A Symbol font may be used to insert Greek letters or special characters. The proposal must be *double-spaced* except indented quotations, footnotes, tables, figures, legends and the literature cited are to be *single-spaced*. Quotations of more than three lines will be single-spaced, set off from the text in a separate paragraph and indented four spaces. Opening and closing quotation marks are omitted. Quotations of three lines or less are enclosed in quotation marks and are run into the text.
Consult the library guide <http://libguides.einstein.yu.edu/thesis>.
- **Tables and Figures** are to be embedded in the document with each group numbered consecutively using Arabic numerals. Figure and table legends should be placed immediately under the embedded graphic. *Be sure that tables and figures are sufficiently large to be easily read by the examiners.*
- **Citations:** *Carefully and correctly reference your proposal!* References should be numbered

sequentially within the text. The *full reference* is cited in numerical order in the Literature Cited at the end of the proposal. Each reference will include the title, names of all authors, book or journal, volume number, page numbers, and year of publication. *The reference list should be limited to the literature relevant to your proposal.* Consult the library guide <http://libguides.einstein.yu.edu/thesis> or ask the reference librarians for help <http://library.einstein.yu.edu/index.php> with questions about proper citation.

Scientific Content of the Proposal

The proposal will describe your proposed thesis project in which specific hypotheses are tested through Specific Aims. *Spell and grammar check your proposal, as a poorly proofed document will make your examiners irritable!* Note that the Qualifying Examination does not include either a personal statement or an explicit preliminary results section. Administrative sections of the NRSA application are also excluded from the *Qualifying Examination*. Below are the sections of the proposal that are included within the 18-page limit.

- 6-page, double-spaced section on Scientific Background and Significance
- 2-page, double-spaced Specific Aims section
- 10-page, double-spaced section on Research Design and Methods (and Preliminary Data, if available)

1. **Background & Significance:** “Briefly sketch the background leading to the present proposal, critically evaluate existing knowledge, and specifically identify the gaps that the project is intended to fill. State concisely the importance and relevance of the research described in this application by relating the specific aims to broad, long-term objectives.” [Form PHS 416-1] This section should be a review of the field and demonstrate the student’s knowledge of the field and relevant literature.

Note regarding preliminary results: Preliminary data from the student’s work should not be included in the Background section and are not required for the Qualifying Exam Proposal. However, if necessary, a concise summary of unpublished results from the laboratory relevant to establishing the significance of the proposed work may be included here.

2. **Specific Aims:** “List the broad, long-term objectives and the goal of the specific research proposed, e.g., to test a stated hypothesis, create a novel design, solve a specific problem, challenge an existing paradigm, address a critical barrier to progress in the field, or develop new technology.” [Form PHS 416-1] The *Qualifying Examination* will typically have two and not more than three specific aims. Students should discuss with their mentor the nature of their proposed aims, the overarching hypotheses and the likely directions and outcomes of the proposed thesis research. While specific aims can be interrelated, it is critically important that one aim not be entirely dependent upon another. The specific aims should be no longer than two pages, double-spaced.

The “Independent” (Third) Specific Aim is developed independently of the mentor or any PI. The mentor will likely comment on this aim, but it should not be something presented to the student directly by the mentor. This aim should still test the hypothesis and will be critiqued for originality and creativity. It is expected that there will be variability in quality and feasibility of the aim, but the point is for the student to incorporate some ideas from outside the scope of his/her immediate laboratory.

This independent specific aim must be indicated by an asterisk (*) in the proposal.

Only the specific departments listed below require the inclusion of the third, independent aim in the proposal:

- Anatomy & Structural Biology,
- Cell Biology, and
- Developmental & Molecular Biology.

3. **Research Design & Methods:** “Describe the research design conceptual framework, procedures, and analyses to be used to accomplish the specific aims of the project. Include how the data will be collected, analyzed, and interpreted. Describe any new methodology and its advantage over existing methodologies. Describe any novel concepts, approaches, tools, or technologies for the proposed studies. Discuss the potential difficulties and limitations of the proposed procedures and alternative approaches to achieve the aims. As part of this section, provide a tentative sequence or timetable for the project.” [Form PHS 416-1] This is the heart of the ‘Qual’; the examining faculty will expect students to be able to elaborate orally on what they have written.

Helpful hint: a student should have a paragraph of additional explanation in mind for each written sentence. It is also important to remember that it is concepts not protocols that the examiners are hoping to hear about! (If including unpublished results, students should remember that the examiners are interested in their ability to elaborate on the ideas expressed in the proposal, not in counting how many gels they have run!)

Submitting the Proposal

Each student is responsible for submitting their proposal *on time* to each examiner on their Qualifying Exam Committee. Students may submit their proposal via email (PDF) or hand delivery of a hard copy. *Check with your examiners to see which they prefer. Please be sure that your proposal is legible regardless of its delivery method!* A PDF of the proposal (with title page) also *must* be emailed to the Graduate Division office on or before the designated due date for submission (see Timeline). *The examining committee is prohibited from accepting a revised proposal after the submission due date.* Each student will have the opportunity to present late-breaking thoughts or results during their 15-minute presentation at the beginning of the oral examination (see below).

The Oral Examination

Audio and/or video recording of the oral examination is expressly prohibited. Any recording will be viewed as a breach of responsible conduct of research and the matter referred to the Academic Affairs Committee.

A student may not approach their own Qualifying Examination Committee members for advice prior to the oral examination.

This is a closed exam. Only the student and the four members of the Qualifying Examination Committee are allowed in the exam room.

Prior to actually beginning of the oral exam, the committee chairperson will ask the student to leave the room so that the examiners can briefly discuss the written proposal and the student's academic performance to date. The student will then be invited to return to the room. *At the beginning of the exam, the student has 15 uninterrupted minutes to summarize the proposal.* A PowerPoint presentation is appropriate (but not required) for this presentation and can be used to remind the examiners of essential concepts, important questions, graphics or preliminary results. If s/he wishes, the committee chairperson may ask the student to 'close the laptop' and conduct the remainder of the examination as a 'chalk talk'.

The oral examination itself focuses on determining whether the student has incorporated the fundamental knowledge needed to progress into full-time thesis research. The written proposal describing a student's "budding" thesis project is the scaffold for the oral examination. However, each student is expected to be able to demonstrate a broad understanding of the basic concepts in biology, chemistry, physics or mathematics that underlie the questions posed in the proposal. In addition to knowledge obtained from graduate coursework and the relevant scientific literature, students will also be tested for knowledge of the primary and alternative experimental strategies and the ability to think on their feet about the strengths and weaknesses of different approaches. *The primary focus of the oral examination will not be preliminary data.* Rather the oral examination will focus on the background, experimental approaches, aims, and how all this fits in the "big picture." A list of representative "mock" questions is available that illustrate the types of questions and level of depth that might be expected.

The examination itself is free-flowing in form at the discretion of the committee. Typically the examiners go around the room for a first round of questions. Students should strive to clearly and concisely answer the questions that are posed. It is equally important to be able to say 'I don't know'. Examinations typically run continuously from one to two hours. However, the committee chairperson can call for a short break if appropriate.

Grading of the Examination

At the end of the oral questioning, the committee chairperson will ask the student to leave the room so that the examiners can discuss and grade the student's performance. Each examiner may vote *Honors* (outstanding, *i.e.* in the top 10%), *Pass* (clear advancement to candidacy), *Postponed Decision* (revision of the written proposal ONLY within *one* month) or *Fail*. A preliminary anonymous vote is followed by discussion and then a final vote. The chairperson will summarize the discussion on the Chair's Summary Evaluation form. A copy of the Summary Evaluation form will be provided to the student and the mentor along with the comments from each examiner. The original reports will be provided to the *Graduate Division office* and a copy forwarded to the *Academic Affairs Committee*.

The committee decision will be as follows:

- A majority vote of 3-1 is required for *Honors*, *Pass*, *Postponed Decision* or *Fail*;
- A 2-2 vote with two examiners voting *Honors* and two voting *Pass* is a grade of *Pass*;
- A 2-2 vote with two examiners voting *Fail* and two voting *Honors*, *Pass* or *Postponed Decision* is a grade of *Fail*;
- A 2-2 vote with two examiners voting *Postponed Decision* is a *Postponed Decision*

After reaching a decision the committee will ask the student to return and will inform the student of the committee's decision. The grade *Postponed Decision* is to be used to obtain revision of the written proposal only. The revised proposal must be distributed to all the members of the examination committee *within one month of the oral exam date*. After submission of a revised proposal, the committee has seven calendar days to submit a final grade (*Pass* or *Fail*) to the Graduate Division office. *If the oral examination is unsatisfactory, even if the written document is acceptable, the grade will be Fail.*

Outcome of the Qualifying Examination

A student who **passes** or receives **honors** following their oral examination will be awarded the Master of Science degree and will advance to candidacy for the PhD degree.

A student who **fails** the oral examination will be placed on academic probation by the *Academic Affairs Committee*. The *Academic Affairs Committee* will review the Qualifying Examination Committee reports, all grades received for graduate courses, and laboratory productivity as indicated by the mentor. (Eligibility to retake the exam is based upon review of the student's entire academic record.) The AAC will either recommend a "retake" of the examination in the next Qualifying Exam period or in some circumstances, recommend dismissal from the program. The examination "retake" is not a "rebuttal" of the failed examination but rather is a fresh independent opportunity to demonstrate the knowledge and insight required for advancement to candidacy.

A student is allowed only one retake of the Qualifying Exam.

A student who fails the retake will be dismissed from the program.

Appeal of Qualifying Committee's Decision

Students may appeal a decision by the *Qualifying Examination Committee* to the parent *Steering Committee*, by making this request in writing to the *Associate Dean for Graduate Programs*. The Associate Dean will review the request and may deny it or may refer to the *Steering Committee* for review. The *Steering Committee* may deny the appeal, in which case the original grade will stand, or may recommend that the student be allowed to repeat the examination with a new Examining Committee.

All information regarding the Qualifying Examination can be found on the Graduate Division website at <http://www.einstein.yu.edu/education/phd/current-students/qualifying-exam.aspx>