II. ADMISSION TO CANDIDACY EXAM - THESIS BACKGROUND SEMINAR AND THESIS PROPOSAL

The Qualifying Examination consists of two parts, a Thesis Background Seminar and defense of a written Thesis Proposal. All examinations will be held at the end of the second year generally during the last weeks of April and first week of May. The Qualifying Exam is intended to test the preparation of a student to carry out thesis research. The student is evaluated based on her/his performance in the formulation, presentation, and defense of a scientific proposal. The thesis background seminar is a 25-minute seminar presenting the background literature and proposed thesis research while the written proposal presents a plausible hypothesis-driven thesis project in the form that follows the NIH guidelines for a F31 pre-doctoral grant. The proposal should contain: 1) Specific Aims, 2) Significance, 3) Approach, and 4) References. Unlike the NIH grant, the documents will be double-spaced and a total of 14 pages in length with two pages for Specific aims and twelve pages for the remaining parts of the research strategy (Significance and Approach). Proposals longer than these page limits (excluding references) will not be accepted and will be returned immediately to the student.

The Qualifying Examination proposal should be hypothesis-driven. In rare cases, a proposal may not have a central hypothesis or major hypotheses for individual specific aims; however, in these rare cases the student must clearly articulate the innovative aspects and significance of the project, the nature of the intellectual challenges, and the manner in which the work can be integrated with hypothesis-driven research. Justification for the approaches to be employed, which will cover these points, should be presented on the Specific Aims page of the proposal as well as discussed in detail elsewhere in the proposal.

Timeline for Qualifying Exams – (All deadlines subject to revision each year)
The following are deadlines; it is fine to meet all deadlines in advance (except for the candidacy exam dates April 15-May 24).

February 4 – The Abstract should be sent to Sarah Squire via email. Include the name of your thesis advisor. Sarah will send this information to the Chair of the Academic Review Committee who will appoint the chair of the Examination Committee; Sarah will forward the name of the Chair of the Exam to the student. In consultation with their advisor the student should identify 3 (or more) additional faculty who would be appropriate for the qualifying examination committee and have these names approved by the Chair of the committee. The student should then contact 3 faculty members to serve on the committee.

The Abstract should be about a half-page in length and include the following information: 1) the general topic of the proposal or question being addressed, 2) the rationale for the study, 3) statement of hypothesis, 4) a general description/approach of the planned research (or Specific Aims), and 5) the significance of the research.

February 18 – Students should send names of Examination Committee members to Sarah Squire.
Students and the Chair of the Committee are encouraged to meet to discuss any potential concerns as early as possible.

March 8 – Students should arrange a time with their committee members for an exam date. To avoid conflicts, dates for all exams should be finalized and sent to Sarah as soon as possible (no later than March 8). At this time, the student should also send the committee members a copy of the current guidelines; this is important because many faculty are also members of other graduate groups that may use a different examination process.

April 15- May 24 – All preliminary examinations should take place during this period. The completed proposal must be given to members of the Examination Committee at least 14 days prior to the defense.

A. Proposal Format
In addition to being hypothesis driven, key features of a successful proposal include: 1) a clear definition of the problem, 2) a concise summary of specific aims, 3) a clear statement of why the work is important, and 4) evidence from the literature that the experiments are feasible. It should not include a broad background of a field, but it is important to demonstrate awareness of critical work by other investigators. It is useful to identify limitations of the proposed research and to indicate the possible significance of anticipated results; this is typically done in the Approach Section. The following guidelines are based on instructions for pre-doctoral National Research Service Award applications. The proposal should be no more than 14 double-spaced pages (excluding the Title Page and References) with at least 1-inch margins and no smaller than 12 point font (11 point Arial is acceptable). Proposals that do not meet these requirements will be returned to the student.

Specific Aims (and hypothesis to be tested). Define the research area of the project. Include a statement of the general objective, hypothesis being tested and a list of Specific Aims. Specific Aims should be numbered. Limit: 2 double spaced pages.

Significance. Explain the importance of the problem or critical barrier to progress in the field that proposal addresses. Explain how the proposed project will improve scientific knowledge, technical capability, and/or clinical practice in one or more fields. Suggested limit: 0.5-1 page

Approach. This section is the heart of the proposal and should probably be divided into separate subsections for each aim. In each of these subsections, describe the overall strategy, methodology, and analyses to be used to accomplish the specific aims of the project. Include how data will be collected, analyzed and interpreted. Discuss potential problems, alternative strategies, and benchmarks for success anticipated to achieve the aims.

It is important to propose alternatives when a given approach may be unsuccessful. It is dangerous to have a Specific Aim completely dependent on the outcome of previous
Specific Aims. At the end of each Specific Aim have a 1-2 paragraph section dealing with "Anticipated Results and Potential Problems." Routine procedures are those that are in standard usage and require only brief explanation. In many instances, routine procedures can be simply referenced, while in others a brief summary of the protocol may be included. In all instances, the student is responsible for a thorough understanding of the techniques cited. If there is unpublished data (e.g. graphs or tables) that need to be provided to show that specific studies are feasible then it should be included in the Experimental Plan section. Suggested limit: ~11 pages.

For additional information, see NIH SF424 Instructions Aims- Approach (see separate PDF).

**Literature Cited/references.** This section does not count towards the 14-page limit. List all literature cited in the text. Include authors, title of article, name of journal or book, inclusive pagination, and year of publication. For book references, include also the name and city of publisher. Use a standard format for bibliographical references such as that found in scientific journals.

**C. Guidance in preparing the written thesis proposal**
The thesis proposal should reflect the work of the student and should not be identical to sections of grants from the thesis laboratory. In cases where the advisor has written a grant on the topic, the advisor’s grant should not be shared with the student until after the qualifying exam. Students are encouraged to interact with faculty, postdoctoral fellows, and other students in developing their ideas and approaches for the written proposal. The thesis advisor is encouraged to help the student develop her/his ideas and to critique the written document with regard to content and style. The thesis advisor, however, should refrain from re-writing any portion of the proposal. The thesis advisor should view this as a valuable learning experience for the student and help her/him develop skills to write a successful grant proposal. Ideally, the advisor will help the student refine her/his critical thinking skills during this process and help train the student in the art of successful grant writing.

**D. Thesis Background Seminar**
The first part of the Qualifying Exam is the Thesis Background Seminar which is a closed presentation and consists of a 25 min seminar presentation on the scientific literature that pertains to the student’s thesis problem. The student presents primarily the background literature that will form the basis of the thesis proposal, but should also indicate the hypothesis to be tested in her/his thesis research and provide a general outline of the approach to be taken. This seminar should not be a progress report on preliminary thesis research already conducted but rather the background for the thesis project, the hypothesis that will be tested and the approaches that will be used to test the hypothesis.

**E. Defense of the thesis proposal**
The second part of the Qualifying Examination is the defense of a 14-page written proposal in the form of a grant that details the experiments and approaches that will be
used to test the hypothesis that will form the basis of the thesis research. The defense will immediately follow the Thesis Background Seminar and will be attended by the student and 4 faculty members representing the examination committee. The thesis advisor is encouraged to attend the exam but is not an active participant in the exam.

**Examination Committee.** The chair of the Examination Committee is appointed by the Academic Review Committee. The chair of the Examination Committee in consultation with the student and advisor appoints 3 members to complete the Examination Committee. This committee will be responsible for evaluating the written proposal and its oral defense. Expertise in the field of the proposal will be considered in selecting members of the Examination Committee. The Qualifying Examination Committee is distinct from the Thesis Advisory Committee; however, the student and advisor may want some or all members of the Examination Committee to become members of the Thesis Advisory Committee following successful defense of the proposal.

**Defense.** The completed proposal must be given to members of the Examination Committee at least 14 days in advance of the defense. The format of the defense consists of a 5-minute Executive Session in which the committee meets without the student to discuss the Thesis Background Seminar and any major concerns with the written proposal. This is then followed by the defense, which is based on questions posed verbally by individual members of the Examination Committee to the student. Questions should require 5–10 minutes to answer and be related to material presented in the thesis proposal. Questions pertaining to feasibility, background information, and extrapolation of results are likely to be asked. Questions testing the ability of a student to integrate the proposal with information obtained from the literature, classes, seminars, and Journal Club are also appropriate. The defense should last 1-2 hours.

Immediately after the defense, the committee meets in closed session to evaluate the student's performance. The prospective thesis advisor remains for about 5 minutes to answer any questions the committee may have and then the thesis advisor leaves to allow the committee to discuss the defense.

**F. Potential outcomes of the defense are the following:**

1) Unconditional pass – permission to begin thesis research

2) Conditional pass – may begin thesis research, but with conditions such as additional coursework which is monitored by the thesis advisor and thesis committee

3) Revise without reexamination – may begin thesis research, but revisions to the written proposal must be submitted to the examination committee for approval before a passing grade is given

4) Revise with reexamination – If reexamination is required, a member of the Academic Review Committee or Executive committee will be added as an extra member to the Examination Committee
if Unconditional pass the student may begin thesis research,
if Conditional pass the student may begin thesis research, but with conditions such as additional coursework which is monitored by the thesis advisor and thesis committee
if Fail then the case will be referred to the Graduate Group Executive Committee with the possible outcome of granting a terminal Masters degree.

5) Fail- the case will be referred to the Graduate Group Executive Committee with the possible outcome of granting a terminal Masters degree.

Revisions of the proposal and/or a second oral defense must be completed by a deadline set by the committee within 4-6 weeks. Exceptions to the 4-6 week timeline may be granted upon consultation with the academic review committee.
Please give the following excerpt from the Student Handbook to your thesis mentor once you start planning your Aims and experiments for your proposal.

B. Guidance in preparing the written thesis proposal

The thesis proposal should reflect the work of the student and should not be identical to sections of funded or unfunded grants from the thesis laboratory. Students are encouraged to read grants or other documents written by members of the group, but should be sure to comply with the University Policies regarding plagiarism. Students are also encouraged to interact with faculty, postdoctoral fellows, and other students in developing their ideas and approaches for the written proposal. The thesis advisor is encouraged to help the student develop her/his ideas and to critique the written document with regard to content and style. The thesis advisor, however, should refrain from re-writing any portion of the proposal. The thesis advisor should view this as a valuable learning experience for the student and help her/him develop skills to write a successful grant proposal. Ideally, the advisor will help the student refine her/his critical thinking skills during this process and help train the student in the art of successful grant writing.

The Qualifying Examination proposal should be hypothesis-driven. In rare cases, a proposal may not have a central hypothesis or major hypotheses for individual specific aims; however, in these rare cases the student must clearly articulate the innovative aspects and significance of the project, the nature of the intellectual challenges, and the manner in which the work can be integrated with hypothesis-driven research. Justification for the approaches to be employed, which will cover these points, should be presented on the Specific Aims page of the proposal as well as discussed in detail elsewhere in the proposal.

Thesis Background Seminar: This seminar consists of a 25 min. seminar presentation on the scientific literature that pertains to the student’s thesis problem. This seminar should not be a progress report on preliminary thesis research already conducted but rather the background for the thesis project, the hypothesis that will be tested and the approaches that will be used to test the hypothesis. The student should introduce the overall topic and present a summary of the observations/data from the background literature that establishes the premise for the proposal including a discussion of the strengths and weaknesses of this previously published work. This portion of the presentation should take approximately 15-20 min of the allotted time and the suggested number of slides for this portion of the presentation is 15-20.

The seminar should also discuss specific hypotheses to be tested in the thesis research. Suggested number of slides for this portion of the presentation: 2-3
The seminar should provide a general outline of the specific aims and approach to be taken.  
*Suggested number of slides for this portion of the presentation: 4-5*  
The potential significance of the work should also be briefly described.