

CANDIDACY EXAM

The Candidacy Exam, composed of a written and oral portion, 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 written proposal presents a plausible hypothesis-driven thesis project in the form that follows the NIH guidelines for a F31 pre-doctoral grant. Unlike the NIH grant, the documents will be double-spaced and a total of 14 pages in length. The proposal should contain: 1) Specific Aims (2 pages), 2) Significance, 3) Approach, (total 12 pages) and 4) References (not included in overall length limits).

Proposals longer than these page limits (excluding references) will not be accepted and will be returned immediately to the student.

The Candidacy 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

The following are general deadlines, with specific dates assigned on a yearly basis; it is fine to meet all deadlines in advance.

November 16 –Abstract submission (e-mail to Sarah Squire)

Abstracts should include your name, thesis advisor, and title.

Abstracts 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.

Chair of the Academic Review Committee will appoint the chair of the Examination Committee; Once a chair is assigned, the student in consultation with their thesis advisor should identify 3 additional faculty who would be appropriate for reading the proposal and serving on the qualifying examination committee. At least two members of the Committee must be from the PGG. All faculty must be approved by the Chair of the committee, and the names of the committee should be sent to the PGG coordinator (Sarah Squire). Once a committee is approved, the student will be notified and should then contact the 3 faculty members with requests to serve on the committee.

December 14 – Students should send final list of faculty that make up the Examination Committee to Sarah Squire.

Students and the Chair of the Committee are encouraged to meet to discuss any potential concerns as early as possible.

One month before exam – 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 January 26). 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.

Defense by February 26, 2021 –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.

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 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.

The completed proposal must be given to members of the Examination Committee at least 14 days in advance of the defense.

E. Defense of the thesis proposal

The second part of the Candidacy Examination is an oral defense of the written proposal. The defense will be attended by the 4 faculty members representing the examination committee. The thesis advisor is strongly encouraged to attend the exam but is not an active participant in the exam.

Examination.

The format of the defense consists of a 5-minute Executive Session in which the committee meets without the student to discuss the academic record of the student and any major concerns with the written proposal.

The candidate will then give a presentation on the scientific literature that pertains to the student's thesis problem. The student will present background literature that formed the basis of the thesis proposal, and elaborate on the scientific premise which should include a discussion of the strengths and weakness of previously performed work upon which the proposal is built upon. The seminar should then discuss specific hypotheses to be tested in the thesis research. The seminar should then provide an outline of the specific aims (1-2 slides; i.e. abbreviated Specific Aims) and the seminar will then go into detail with specific information on the approaches to be taken along with expected outcomes.

- Keep in mind while there is no strict slide limit, students should prepare a 25 min presentation. The thesis committee will be instructed to give the student uninterrupted time to present background information at the beginning of the exam (approx. 5-10 min) but the student should expect to be regularly interrupted during the exam with questions. Thus, it may happen that students do not get a chance to complete their presentation. This is not a factor that will be considered in the overall evaluation of the student's performance.

As in the written portion the oral exam will assess if the student has:

- Clearly defined the central biological question and significance?
- Clearly stated hypotheses?
- Proposed aims that effectively test the hypotheses?
- Discussed pitfalls and alternatives?
- Demonstrated depth and breadth of knowledge (conceptual and technical)?
- Exhibited independence of thought?

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 total examination, including the presentation should last 1-2 hours.

Immediately after the examination, 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 Master's degree.
- 5) Fail- the case will be referred to the Graduate Group Executive Committee with the possible outcome of granting a terminal Master's 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.

The chair of the committee is also asked to prepare a brief written report for the student describing strengths and opportunities for improvement. This can be provided in bullet format.

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.

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