Preliminary Exam Guidelines: Microbiology and Immunology Division/Department of Pathology

Goal:
The goal of the preliminary exam is to determine whether the student is prepared for PhD-level work. The committee will evaluate the student’s general knowledge (including coursework up until the exam date), knowledge of his/her field, and critical thinking and writing skills.

Overview:
The preliminary exam consists of two parts:
1. A written proposal based on the student’s thesis project. This proposal should consist of 2-3 specific aims. At least one of these aims must be independently conceived and developed by the student and not based directly on any work proposed by or ongoing in the thesis lab. If the student chooses to not write directly on his/her thesis project, the proposal can focus on any project in the student’s field that is not currently under investigation in the thesis lab.
2. An oral exam that includes defense of the proposal and general knowledge. “General knowledge” includes the thesis field of research, all coursework up until the time of the exam, and general molecular biology, biochemistry, cell biology, and genetics.

Exam committee:
The exam committee should be the same as the student’s thesis committee. The committee should consist of four members plus the thesis advisor. At least one member should be from outside the Pathology Department, and at least three members must be from the Pathology Department. The student should work with his/her advisor to choose committee members.

Timeline:
The preliminary exam should be completed by the end of the fall semester of the student’s first year in the thesis lab (second year in graduate school for PhD students, third year for MD/PhD students). It is the student’s responsibility to perform the tasks associated with scheduling and preparing for the exam.
1. Select an exam committee and schedule a date and room. The committee must be formed and the prelim coordinator notified of committee membership by September 30th at the latest. The exam should be scheduled for no later than the final day of the semester.
2. Prepare the preliminary exam proposal. The preliminary exam period begins six weeks before the exam date. The student is expected to read and think deeply and broadly in his/her field and prepare his/her exam proposal. In addition to daily reading and writing, the student is expected to continue to complete lab and department responsibilities, including attending journal clubs, seminars, and lab meetings.
3. Send the Specific Aims page to the committee at least four weeks prior to the exam date. The student is expected to meet individually with each committee member to discuss the specific aims, particularly the student-derived aim(s) and revise the aim(s) based on committee feedback before preparing the final proposal.
4. Prepare for the oral exam and submit the final proposal. The proposal is due to the committee at least one week prior to the oral exam date. The student should
prepare a presentation that would take 30 minutes to present without interruptions.

Written proposal:
The proposal guidelines follow those of the NIH F31 Predoctoral Fellowship application.

Applicants must describe a well-defined research project that is well-suited to his/her stage of career development and can be accomplished by the individual within the time-frame of the training period (3-5 years). The text of the written proposal must be the student’s original writing. Students may not use text from the thesis advisor’s previous grants or papers or any previous Prelim Exam by students in the laboratory. Plagiarism in a Prelim Exam is grounds for failure. The thesis advisor, mentors, and examiners may not comment on the written exam before the oral exam.

Content (excerpted from NIH NRSA F31 instructions):
Specific Aims (1 page)
Introduce the problem that will be addressed. List succinctly the specific objectives of the research proposed, e.g., to test a stated hypothesis, create a novel design, solve a specific problem, challenge an existing paradigm or clinical practice, address a critical barrier to progress in the field, or develop new technology. Summarize the experimental approach in Specific Aims (including at least one novel student-developed aim), where each aim reflects a major research goal. While specific aims can be interrelated, it is critically important that one aim not be entirely dependent upon another. Summarize the expected outcome(s), including the impact that the results of the proposed research will exert on the research field(s) involved.

Research Strategy (6 pages)
Organize the Research Strategy in the specified order using the instructions provided below. Start each section with the appropriate section heading — Significance and Approach. We strongly suggest including figures as appropriate; to increase the incentive for the student to create figures, these will not count towards the page limit. Figures can (but are not required to) include the student’s own preliminary data as well as data from the laboratory. If the student includes data from a lab member/collaborator, these data must be appropriately attributed and the student should obtain permission from the person who generated the data (if unpublished). The student should also consider including figures that show predicted experimental outcomes as well as a graphical abstract or diagram that illustrates aspects of the models or hypotheses being tested to help orient the reviewers to the design of the study. If the student presents predicted experimental outcomes, these data should be in cartoon format and should NOT be made from photoshopped images of real gels, microscopy pictures, etc. This restriction applies to the oral presentation slides as well. These figures should be clearly labeled as predicted and not actual experimental outcomes.

Significance
- Introduce the problem or question that will be addressed in this study
- Provide a review of the field that explains 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 the relevant research 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.

**Approach**
- Describe the overall strategy, methodology, and analyses to be used to accomplish the specific aims of the project.
- Describe how the data will be collected, analyzed, and interpreted
- Discuss potential problems, alternative strategies, and benchmarks for success anticipated to achieve the aims
- If the project is in the early stages of development, describe any strategy to establish feasibility, and address the management of any high-risk aspects of the proposed work.

**Bibliography and References Cited (no page limit):**
Cite published experimental details in the Research Strategy section and provide a bibliography of any references cited. Each reference should be formatted according to NIH standard guidelines. This is a good time to learn to use available citation software such as Endnote. The bibliography should be formatted using the “NIH” output style and must list all authors and full titles of the articles. Students should be especially careful to follow scholarly practices in providing citations for source materials.

**Page Formatting:**
Font: Arial 11 point in the main text. Font in figures and figure legends should be Arial 9 pt font.
Spacing: Single Spaced
Margins: 0.5 inch page margins on all sides.
Language: Formal Scientific American English. Avoid jargon. If terms are not universally known, spell out the term the first time it is used and note the appropriate abbreviation in parentheses. The abbreviation may be used thereafter.

**Oral Exam:**
The goal of the oral examination is to determine whether the student has the fundamental knowledge and skills needed to succeed in their thesis research. The exam committee will be evaluating the student’s knowledge of his/her field, critical thinking skills and ability to formulate hypotheses, originality and creativity, and presentation skills. The student should prepare a presentation that would take 30 minutes to present without interruption for the oral portion of the exam. This presentation should summarize and defend the proposal and the student should be prepared for numerous interruptions. The student is expected to have substantial depth of knowledge in the thesis area, broadly defined. The examiners are interested in a student’s understanding of the concepts, assumptions, and limitations of their proposal and ability to address any questions/concerns, including designing additional experiments or revising existing ones. A key element of the oral examination will be an explanation and defense of the importance of the questions to be addressed, placement of these questions in the broader context of the field, and a logical presentation of how the proposed experiments will answer the questions posed. The student is expected to be well-versed in the relevant literature and broader areas, including cell biology, genetics, molecular biology, and biochemistry. **It is recommended that the student organize a mock oral exam involving other students and post-docs to practice in preparation for the**
questioning of the oral examination. The thesis advisor, mentors, and examiners may not participate in mock examinations.

Role of the Thesis Advisor:
The student is encouraged to consult with his/her thesis advisor during preparation for the exam about the concepts and principles of the study. The thesis advisor can have conversations with the student about specific aims and provide guidance and recommendations on the development of the experimental approach. However, the student is responsible for crafting of a document that speaks in his/her voice and the details of the proposal should be developed by the student. The thesis advisor should not read or edit the student's written proposal before the oral exam.

The thesis advisor will be asked at the beginning of the oral exam to comment on how much of the proposal includes details and ideas synthesized by the student, rather than verbatim from the advisor and lab members. The thesis advisor is asked to confirm that the written document is the student's own writing and does not include text from grants or papers. **At least one of the Specific Aims should be entirely conceived and developed by the student.** The thesis advisor is not allowed to participate in mock examinations in preparation for the oral exam.

Exam day procedure:
The student should schedule the exam for two hours. Once the committee has gathered, the student will be asked to leave the room. The committee will then:

1. Decide who will serve as the exam committee chair-person. The chair must be someone other than the thesis advisor.
2. The thesis advisor should report on the extent to which the proposal includes details and ideas synthesized by the student, rather than verbatim from the advisor and lab members.
3. The thesis advisor is asked to confirm that the written document is the student's own writing and does not include text from grants or papers.
4. The thesis advisor is asked to confirm that one of the Specific Aims was entirely conceived and developed by the student.
5. Discuss the student's overall record, particularly any deficiencies that might need special attention in the oral questioning.
6. Discuss the written proposal and identify any weaknesses that should be pursued in oral questioning.

The chair will then invite the student to return to the room and ask the student to begin the prepared 30 minute presentation. The committee should interrupt the student during the presentation with questions about the proposal, general knowledge related to the topic proposal, or general knowledge in broader fields. At the conclusion of the presentation and questions the student will be asked to leave the room. The exam committee will discuss the student's performance and decide on a recommendation (pass, conditional pass, or fail). The thesis advisor can stay in the room to help relay content and advice from the committee’s discussion to the student, but the thesis advisor should remain quiet unless asked for input by the committee. The student will be asked to return to the exam room, and will be told the results of the exam. The committee chair and committee members will give the student feedback on their performance, including suggestions for how to improve their knowledge base and skill sets.

Exam scoring:
It is the responsibility of each specific Prelim Exam Committee to decide whether it is in the best interest of the student and the department for the student to advance to
candidacy and continue with their thesis research. The successful completion of a PhD dissertation requires substantial commitment of time and resources on the part of the student as well as the thesis advisor, faculty and institution. The student will be evaluated based on several criteria outlined in detail on the Prelim Exam scoring sheet including, knowledge of their field, critical thinking and the ability to formulate hypotheses, originality and creativity, and writing and presentation skills.

Possible outcomes:

1. **Pass:** The student receives a full pass if the committee feels that they have performed well on all aspects of the exam and are qualified to work towards a doctorate.

2. **Conditional pass:** If a student performs well overall, but exhibits a significant deficiency in one area, the committee may require additional work in that particular area. This could include additional coursework, rewriting the proposal, or an additional oral presentation.

3. **Fail:** If a student fails the Prelim Exam, the committee feels that they were severely deficient in one or more aspects of the exam. The student has the right to retake the exam within a 4-6 week time frame. However, if the committee thinks that the deficiencies are such that the student is unlikely to pass the second time, they will say so. The student will receive either a full pass or fail. If the student fails the second exam, the exam committee will pass that information onto the Graduate Committee and recommend termination. This recommendation must be approved by a vote of the entire Graduate Committee and all appeals must go through the Graduate Committee.

**Implementation:**
The new preliminary examination guidelines will apply to the Fall 2016 entering class (current first years). Second year students who joined the Pathology Department in Fall 2015 will take the preliminary examination under the old format.