Qualifying Examination

The Qualifying Examination given to all second/third year Ph.D students in the Institute of Microbiology and Immunology who have completed all course requirements. The intent of the Qualifying Examination is to determine whether the student is capable of Ph.D. level research. The student must pass this exam in order to be advanced to dissertation status and to remain in the program. The Qualifying Examination consists of 2 parts: the written Proposal and the oral Defense. Graduate students will be required to submit a written research proposal and to prepare a 50-minute oral presentation on a research project of their choice.

Particular attention should be paid to the following when preparing the written proposal and oral presentation:

In order to pass the Qualifying Examination, graduate students must demonstrate a solid understanding of the general area of research of the proposal. This entails a close familiarity with seminal papers in the field, including literature describing key findings that gave rise to the research area in question. Students should have familiarized themselves with unanswered questions in the field of study and should be able to address which questions will be answered by the proposed experiments. It is critically important that students be able to articulate why the questions investigated in their proposal would be worth the effort, and also how the proposed research would contribute to the field of study. Students should anticipate different possible experimental results of their proposed research and what additional questions these findings may raise.

In both the written proposal and the oral presentation, emphasis should be placed on appropriately detailed, informed discussion of why the organism and experimental approaches chosen are appropriate for the proposed research. If other organisms and/or techniques could or are being used in this field, the advantages and disadvantages of each should be assessed.

It is essential that students critically evaluate the conclusions from the previous experiments (published and unpublished) upon which their proposal is based, rather than merely accepting these conclusions. If some conclusions are not sound, then the effect that this has on the proposal should be evaluated in detail. Finally, it is vitally important that potential experimental pitfalls in the proposed research are acknowledged and that careful thought has been given to what could increase the chance of success or what would be done instead.

The Proposal

In the Qualifying Examination, the student proposes and defends a plan for his/her thesis project or any other project/problem. The proposal should be in English, typed in 12 point font, with one inch margins and 1.5 spacing. The organization of the written proposal, along with suggested page lengths, is as follows:

- **Specific Aims** (1 page). Describe both the broad, long-term objectives of your research, and what the specific research described in this proposal is intended to accomplish. In most cases, specific aims of the research should be listed in numerical order, with a brief description of each aim. An average proposal will probably contain 3 aims.

- **Introduction and Background** (3 pages). The main purpose of this section is to put your research in a larger prospective. Give a concise history of the problem, and justify its importance and relevance. Point out the main issues which currently occupy attention in the area, and identify the gaps that your project is intended to fill. Include annotation of cited references.

- **Preliminary Data (3 pages):** Preliminary data, if available, should be presented, described and interpreted. Briefly describe the research that you have done to date. Begin by describing what question(s) you set out to answer, and then present your results. Concisely describe the methods that were used, quoting references for commonly used procedures. Flow charts may be helpful in some cases. Your results may be presented in graphic, tabular, or other form, and may be provided as figures in an appendix (not included in the length limit). All figures and tables should be of good quality, clear, and properly labeled and titled. Discuss the interpretation of your results. What conclusions could be drawn from them, and what questions were left unanswered? What alternative approaches might be tried, and what further experiments are indicated? Use this as a lead in to the next section. Similar principle can be applied to citing published data from a non-thesis proposal

- **Research Design and Methods (10 pages):** In this section you should describe the research design and the procedures 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. Discuss the potential difficulties and limitation of the proposed procedures, and alternative approaches to achieve the aims.

- **Literature Citations (~ 50 references):** This should include all references cited in the preceding sections, using a standard format of journals relevant to the field. Titles should be included for all references. Each citation must include the names of all authors, name of the book or journal, title of article, volume number, page numbers, and year of publication. The literature section does not count against the page limit of the proposal.

- **Appendix:** Include Data and Diagrams referred to in the text. Figure legends should be included, but should not be used to circumvent the page limit.

The emphasis of the proposal should not be on a review of the literature but on dealing creatively with the problem selected. The Proposal should be "hypothesis-driven". That is, it should aim explicitly to address a working hypothesis regarding an unresolved issue in

the chosen field. It is important to remember that the proposal should describe work that can reasonably be done by one person in 2-3 years.

Oral Examination

The oral presentation should be based on the written proposal and should demonstrate a clear and detailed understanding of the material covered in the proposal and a strong general understanding of the course material and current literature in the student's field. Students are expected to have thoroughly investigated their research area of choice (including critical evaluation of available literature) and should be prepared to discuss and defend the appropriate experimental design and rationale for their proposed research during the oral presentation.

The oral presentation based on the written proposal should be approximately 50 minutes in length. Organization of the seminar will normally include a general introduction, rationale for the proposed research, statement of the problem, preliminary data obtained, proposed experimentation and potential results. Slides and other visual aids are to be clear and of good quality.

The examination will be open to the public. An announcement of the seminar should be posted by the Department Office a week before the examination date. The Chairperson of the Examination committee will introduce the student to the audience. The committee members should agree upon if questions can be asked during student's presentation or should be reserved until the end of student's presentation. The examination should last no more than three hours. The research mentor can only be present as an observer.

Possible outcomes

Each student's performance should be evaluated in four areas: 1) quality of the written proposal, 2) quality of the oral presentation, 3) defense of the proposal, and 4) general knowledge.

Pass*:* It can represent a range from absolutely stellar performance to a good, generally solid one. It is appropriate to give a pass when the performance is good, but not perfect, and perhaps was not all that the examiners think the student might be capable of doing. All four aspects listed above should come into play in the discussion, and a very strong performance in one area may serve to offset a weak performance in another area.

Conditional Pass*:* If the Examination Committee can identify a deficiency in the student's performance that is believed to be correctable within a reasonably short period of time, the Committee will attempt to detail, both verbally and in writing to the student, the nature of the problem(s) and the requirements for successful remediation. A time limit, not to exceed two months, will be set. If, in the opinion of the committee, the student fails to adequately remediate the deficiency in the specified time frame, he/she will then fail the exam. If the student is judged to have remediated it successfully, she/he will then have passed the exam.

Situations that may warrant a “Conditional Pass” include: (1) a serious pitfall in an otherwise satisfactory proposal that can be remedied by revision of an experimental design or method of analysis; (2) the failure to recognize, deal with or interpret a likely alternative outcome(s) of an experiment and its implication; (3) a poorly written or poorly documented section of the proposal requiring substantial revision; and (4) the lack of sufficient understanding of a method of data acquisition (e.g. an assay procedure) or analysis (e.g. appropriate statistical method) viewed as a critical component of the research. The “Conditional Pass” should not be used to remedy a serious deficiency in fundamental knowledge that should have been attained by the student through required coursework.

Failure: This is the outcome when the written proposal is completely unacceptable or performance on multiple aspects of the exam is unacceptable. If the overall performance of the student was weak, or if there were significant deficiencies in more than one of the areas being evaluated, the student should fail the exam. A student who fails will automatically get a chance to rewrite the proposal and defend it at another oral examination. A student who fails the exam twice must leave the program.