Doctoral Comprehensive Examination (BME program requirements)

Each student must pass the PhD qualifying exam before they can take the comprehensive exam. The requirements for the comprehensive exam are spelled out below, under UNM requirements. The content of the comprehensive exam vary by department and program. The NSMS program requirements are spelled out below. These include a written research proposal submitted one week before the oral examination which is conducted by the student's Committee on Studies. The written proposal should be delivered to the committee member as a printed document and not via email. Prior to the examination, the student must file an Application for Doctoral Candidacy. The student also needs to file with the Office of Graduate studies the announcement form providing a notice of comprehensive exam two weeks before the examination date.

The comprehensive exam is based on the student's preparation to undertake research that will lead to the Ph.D. degree. Hence the student is expected to present the research proposal in written and oral form. The Ph.D. proposal should follow the guidelines for a typical NSF or NIH proposal The proposal can be no more than 15 pages of single spaced text including figures, but exclusive of references. Additional data can be included in an Appendix. The written proposal should be concise and include the following sections:

(a) Cover page

This includes the Title of Proposed Project, the student's name and previous degrees (Year, Instiution and Major field of study). The title of the project must be brief, scientifically or technically valid, intelligible to a scientifically or technically literate reader, and suitable for use in the public press.

(b) Abstract

The proposal must describe in less than one page, the motivation for the work, a statement of objectives and methods to be employed, the expected outcomes of the research and its significance. It must clearly address the following two review criteria which are used by NSF/ NIH during the review of all submitted proposals.

The intellectual merit of the proposed activity;

How will the proposed research advance knowledge and understanding within its own field or across different fields? To what extent does the proposed activity suggest and explore creative, original, or potentially transformative concepts? How well conceived and organized is the proposed research? Is there sufficient access to resources that will be required for the research – ie facilities, funding for materials and supplies, etc.? Finally, how well is the student qualified to conduct the research – ie describe your previous work, so the committee can be reassured about your potential to conduct the proposed research.

The broader impacts resulting from the proposed activity.

What will be the benefits of the proposed research to society, in terms of adding to the knowledge or technology base, or providing new materials, new methods of analysis, new theories or solutions to major societal needs, etc.

The Project Abstract should be informative to other persons working in the same or related fields and, insofar as possible, understandable to a scientifically or technically literate lay reader. It should provide an indication of the outcomes that can be expected if the proposed research is successful.

c. Project Description

The Project Description should provide a clear statement of the work to be undertaken and must include: objectives for the period of the proposed work and expected significance; relation to longer-term goals of the research group; related work elsewhere; previous work done by the student; proposed work; approach; timeline; outcomes and significance. The project description can be broken down into the following sections:

Introduction

Your introduction should start with a clear and concise *Statement of the research problem*. For example, the proposed research will ….. as an action statement. This will make clear to the reader right away what you are going to study. Then justify this statement by explaining the context in which the work is being proposed (for example global climate change, energy, need for clean air, etc.). Define the need for the work within this context, by getting more specific about what you plan to do. You must clearly state the relationship of the proposed work to the present state of knowledge in the field, to work in progress in your advisor's research group and to work in progress elsewhere. If necessary, provide a separate section on Review of Literature, otherwise work in the key literature references within your introduction. State clearly what is novel and original about your proposed research.

Objectives

Define clearly the objectives of the doctoral research.

Research Plan

Provide a clear description of experimental methods and procedures.

Previous Work

Describe the work that has been completed by you thus far, which will also provide evidence that the resources necessary for the proposed work are indeed available.

Proposed Work

Explain what needs to be done.

Plan of Research

If useful, provide a matrix of the variables you will explore and what experiments you will conduct.

Timeline/Milestones

What do you expect to achieve, by what date. Which activities will happen in parallel. If you have a clear idea, outline a few of the manuscripts you plan to write based on your results, and when you expect to have then submitted. If your research is already funded, work in the milestones and deliverables you are expected to provide to the project.

Significance
Your proposal should end with a description of what you expect to achieve if you are successful and why will this be important. Who will care? You can write this in the context of the broader impacts resulting from the proposed activities, addressing one or more of the following as appropriate for the project: How will the results of the enhance scientific and technological understanding; and what will be the potential benefits of the proposed activity to society at large.

Doctoral Comprehensive Examination (UNM requirements)

A doctoral student must pass a comprehensive examination in the major field of study. This examination, is not limited to the areas of the student's course work, but tests the student's grasp of the field as a whole. It is strongly recommended that the Application for Doctoral Candidacy. be completed and approved by the graduate unit before the student takes the doctoral comprehensive examination. The administration of this exam is governed by the following guidelines:

1. The student must have a cumulative grade point average of at least 3.0 at the time of the examination.
2. The student must be enrolled in a minimum of one credit of graduate course work the semester in which he/she takes the doctoral comprehensive examination.
3. At least two weeks prior to the date of the examination, the major graduate unit must request approval from the Dean of Graduate Studies to hold the exam. It may not be conducted until the Dean of Graduate Studies approves the appropriate announcement form and it is returned to the unit.
4. The doctoral comprehensive examination committee (usually the student's Committee on Studies) consists of a minimum of three members approved for committee service. Two members must be in Category 1 or 3; the chair of the committee must be in Category 1, or 3 if within the student's major; one member must be from Category 1; and no more than one voting member can be in Category 4.
5. In order to qualify to sit for a doctoral exam during the intersession, the student must be registered for the following semester.
6. Barring extraordinary circumstances, the graduate unit will notify the student of the results of the examination no later than two weeks after the date on which it was administered. Should such circumstances arise, the graduate unit will notify the student in writing of the reason for the delay and let him/her know when notification can be expected.
7. The results of the examination must be reported to the Dean of Graduate Studies on the "Report of Examination" form no later than two weeks after the date of the examination.
8. If a student fails the examination, the Committee on Studies may recommend a second examination, which must be administered within one calendar year from the date of the first examination. The doctoral comprehensive examination may be taken only twice. A second failure will result in the student's termination from the program.

Conditional Pass

Having evaluated the materials required for the examination, if the Committee feels that, although the student has demonstrated knowledge and understanding of the field, it is not quite sufficient to justify a grade of "pass", the committee may assign the grade of "Conditional Pass" and require that the student meet additional conditions before a grade of pass will be awarded. The student must meet the conditions noted on the Conditional Pass by the end of the subsequent term. However, students who plan to graduate in a specific term must resolve a Conditional Pass by the posted deadline for submission of examination results. The committee will note the conditions that need to be met by the student on the examination form.

Advancement to Candidacy for the Doctoral Degree

A key requirement that must be satisfied in order to earn the doctoral degree is Advancement to Candidacy. The process is begun by completion of the "Application for Doctoral Candidacy," which formally summarizes a student's doctoral program of studies. Approval of that program of studies by the student's doctoral Committee on Studies is indicated by their signatures on the form, along with that of the graduate unit chairperson.

The completed "Application for Doctoral Candidacy" is usually forwarded to the Dean of Graduate Studies during the semester in which the student has passed his/her doctoral comprehensive examination and no later than the semester before he/she wishes to graduate. It should be accompanied by the "Report of Examination" and, if the program has a language or a skill requirement that the student has met, completion of this requirement should be noted on the application form where indicated. If the language/skill requirement is not noted on the Application for Candidacy a "Certification of Language or Research Skill Requirement" form must be submitted before the student is advanced to candidacy.

After determining that all requirements except for outstanding course work and the dissertation have been fulfilled, the Dean of Graduate Studies will advance the student to candidacy.

Faculty Approvals

The Office of Graduate Studies must approve all members of student committees' prior to appointment to the committee. Approval is requested by completing the Faculty Approval Form and submitting it, together with curriculum vitae to the Office of Graduate Studies. The Faculty Approval form should be submitted to OGS a minimum of two weeks before the student's committee is announced.

The categories of faculty approvals for service on student committees (with the approval of the unit faculty and the Office of Graduate Studies) are as follows:

- **Category One**: UNM tenured or tenure-track faculty or UNM-National Laboratory Professors. Role: chair or a member of any master's or doctoral committee in any discipline, regardless of their FTE status.
- **Category Two**: Tenured or tenure-track faculty at other institutions. Role: external member on dissertation committee.

- **Category Three:** Individuals whose primary employer is UNM and who hold the titles of research professor, research associate professor, research assistant professor; clinician educators with the rank of professor, associate professor assistant professor or faculty hired onto the flex track or "V" category in the School of Medicine. Role: chair, co-chair, or member of master's or dissertation committee; may only chair or co-chair committees if within the student's major.
- **Category Four:** Others who are considered experts in the field. Role: voting member of the committee.

FROM “PrincipalInvestigators.Org”

5 Common Mistakes That Will Sink Your Grant

The challenge that all reviewers face as they try to separate the outstanding from the merely good is to convert their intuitive, emotional response to a grant into a series of bullet points that encapsulate the proposal’s strengths and weaknesses. Avoiding these pitfalls, and appreciating the issues that frequently diminish reviewer enthusiasm, should help you to write a better grant. Here are 5 common mistakes that recur among the grants of both first time and experienced PI’s.

1. The reviewers did not find your central scientific question interesting.
2. The preliminary data are weak, and call into question the feasibility of the proposal and the validity of your central hypothesis.
3. The proverbial house of cards: the overall success of the grant is dependent on the outcome of a key experiment, which has yet to be performed.
4. The scope of the project is too ambitious, with multiple hypotheses or rationales that full the grant in disparate directions.
5. The PI and or research team lacks the experience to carry out the proposed work.

1. The reviewers did not find your central scientific question interesting.
Arguably the single most common reason for a grant receiving a low score is the perception by reviewers that your central scientific question lacks significance. Grants that address significant questions provide reviewers with confidence that the results will have commensurately high impact. Reviewer disinterest in your question could stem from a failure to communicate its significance clearly, an overly narrow focus, or a lack of novelty and originality that suggests you are addressing a problem already solved. A common pitfall is that the applicant is so enamored of a particular technology or set of new observations that he or she fails to explain how the work will transform a field, or fails to highlight important links between the work in question and other fields. In today’s “Omics”-driven scientific world, one may no longer be chained to the single over-arching hypothesis, but it is still necessary to provide your readers with a clearly understandable strategy for organizing and interpreting that mass of high-throughput data. One way to test the significance of your proposal is to provide a non-expert colleague with a three-sentence description; if he or she can appreciate why you are doing the work, then you are on the right track.

2. The preliminary data are weak, and call into question the feasibility of the proposal and the validity of your central hypothesis.
A second flaw that can doom your proposal is an overly large gap between your hypothesis and the actual data available to be cited or displayed (as preliminary data). A highly provocative hypothesis might be just the thing your field needs but, like a good murder mystery, your jury won’t be convinced without detailed evidence. For example, you may have an exciting hypothesis around dinosaur physiology, but if proving your hypothesis requires the results of experiments on fresh dinosaur tissue, you’ve got a problem. Thus, your reviewers must be convinced of the chain of logic that connects your elegant hypothesis to the actual data presented in the grant, whether published or in preliminary form. Along these lines, a second flaw that kills some applications is a gap between the hypotheses presented, and what the results are actually likely to show. If reviewers perceive that the results will actually be quite a bit more mundane than what the central hypothesis is proposing, their scores will reflect this accordingly.

3. The proverbial house of cards: the overall success of the grant is dependent on the outcome of a key experiment, which has yet to be performed.
When one designs a complex research project, there is a natural tendency is to organize the experiments in a linear and sequential fashion, such that the results of each forms the basis of the next in series. As a template for a research grant, however, this strategy can be risky. If the succeeding aims all depend on a positive outcome of Aim One (whose outcome is as yet unproven), then the fate of the whole grant depends on the success of that first experiment. Likewise, if you are applying for a three-year grant, resist the temptation to anchor the grant to a question that will take 20 years before meaningful tests of the hypothesis can be proposed. In general, reviewers have a much easier time advocating for a grant whose aims are independent, but mutually supporting, with experiments that will provide useful information whether or not your starting hypothesis is true.

4. The scope of the project is too ambitious, with multiple hypotheses or rationales that full the grant in disparate directions.
Another common flaw of novice grant writers is the “spaghetti syndrome”, where every good hypothesis, experiment, or reagent in the PI’s pantry is thrown at the problem. This approach rests on the assumption that reviewers will find at least a few good ideas stuck on the proverbial wall, and this will raise their enthusiasm. In reality, these types of organizational flaws generally diminish enthusiasm, because they signal a PI unable to prioritize among various facets of the project, which down the road can lead to an inefficient deployment of people and resources. Your research plan should portray a realistic balance between what you hope to accomplish, and the number of junior researchers that you will have available. A tricky scenario that will typically generate a spirited discussion around the table is the grant that has three great aims, but also a fourth and final aim that is less interesting or feasible. A good grant will generally try to strike the correct balance between the conservative/feasible and the risky/adventurous: different reviewers may very well come down at different points along the spectrum.

5. The PI and or research team lacks the experience to carry out the proposed work.
Once reviewers have determined that the work is significant and the approach is valid, they have to answer the question, “Is this the appropriate PI to carry out the work?” For first time and early investigators, the training and accomplishments during the post-doctoral years will provide clues about the likelihood of success. For more senior investigators, past career experience and productivity will be scrutinized carefully. Reviewers will generally accept any approach that you have previously published on, but to move your field forward, you will typically have to display innovation and creativity in adapting and developing new approaches. If a particular approach is unproven with respect to your lab, the most reliable strategies are 1) identifying and soliciting an outside collaborator with a published track record in the method, or 2) devoting existing lab efforts to generate the preliminary data to remove doubts about your ability. In general, this is arguably the most important use of “updates”, short progress reports that can be sent to the SRA after the submission of your grant, but before the panel meets to discuss it.