

Candidacy Exam Structure for Biochemistry PhD Students
Department of Chemistry and Biochemistry
Univ. Missouri St. Louis

Last updated 12/7/04

Effective with the Fall 2004 incoming class, PhD students interested in biochemistry will not be taking monthly cumulative exams. Instead, they will complete candidacy requirements as follows:

A. Written Exam. This portion of the exam has two components:

1. Biochemistry Exam. This exam will be administered in April of each academic year for second year biochemistry students. The exam will be composed of three sections:
 - a. General biochemistry. Review of a general biochemistry textbook should provide adequate preparation.
 - b. Literature skills. General literature reading and participation in journal club will develop this skill.
 - c. Special topics sections. Each Biochemistry faculty member will contribute a section to the exam which will reflect his/her special topic(s). Of the five anticipated contributions, students are required to pass three of these sections.

All second year students will be required to take the exam. First year students are strongly encouraged to take the exam for practice. Exams submitted by first year students will be graded to provide feedback but will not count toward written exam requirements.

For the second year students, there are three possible determinations:

- a. Pass – fulfillment of this requirement.
- b. No pass - Student does not display sufficient understanding of biochemistry to remain in the PhD track, and is not anticipated to acquire it in a timely fashion. Students will be encouraged to obtain an MS or leave the program.
- c. No pass with an invitation to retake the exam. Student did not pass, but otherwise indicates potential to do so in a second attempt. The faculty expect this to be exercised only as a rare exception to the above outcomes. It should not be viewed as a guaranteed “second chance” option. These exams will be administered in December of the same calendar year. Failure to pass the second exam indicates insufficient background to complete the PhD program.

These results will serve as recommendations to the Chemistry Faculty during the annual May meeting to discuss graduate student progress.

2. Dissertation Proposal. Students who successfully complete the Written Exam (1, above) will prepare a written proposal of their dissertation research.

The dissertation proposal is a document which describes your project, including both experimental progress to date and a description of proposed work. As a guideline, this proposal should be approximately double-spaced 10 pages in length. Although it is a much shorter document, it should have the elements and organization of an NSF or NIH proposal. The basic structure is as follows. Suggested lengths for each section are given in parentheses.

Introduction/Statement of Specific Aims. (≤1 p) Briefly introduce the experimental problem, describe why it is important, and present specific aims, or overall experimental goals. Examples:

- a. Identify/design a ligand which inhibits enzyme activity
- b. Test the hypothesis of substrate-assisted catalysis
- c. Determine the role of conformational changes in protein function

Background/Significance. (2 p) In this section, present background information on your research area. Describing previous work by yours and other groups and present the open questions which your research directly addresses. Here it is appropriate to discuss potential applications of your work. Why do we care about your project? Why should it be funded or published?

Preliminary Results. (3 p) In this section, you will describe what you have accomplished thus far in your research, as well as how it fits into the overall experimental plan. Figures and tables should be included as necessary to illustrate your work.

Experimental Plan. (5 p) This should constitute the main body of the proposal. Using the specific aims as an outline, describe the remaining experimental goals and how you plan to execute them. This should include descriptions of methods used and/or developed. Since experimental science can be unpredictable, you are not locked into what you propose here. Just present your research plan as best you can at this point in your progress.

The dissertation proposal should contain references to other work as appropriate, and these should be cited in a commonly used format.

If you have difficulty in grasping the style of this document, look at other proposals. Visiting the NSF or NIH websites (www.nsf.gov or www.nih.gov) can provide additional information and examples of abstracts for funded projects.

B. Oral Defense of the Dissertation Proposal. This portion of the exam also has two components:

1. A formal seminar on this topic is to be delivered to the Department. Students are expected to prepare and deliver a professional quality presentation and upon its conclusion, to answer questions from faculty and students.
2. Oral Examination by Committee. Upon adjournment of the seminar, faculty committee members will examine the student by verbally asking questions. These questions will involve aspects of the student's project, background literature, experimental details, and underlying biochemistry concepts. The successful student will demonstrate an acceptable level of understanding of these areas.

Journal Club

Scientific professionals keep up with one another's work and the literature through participation in a journal club. All biochemistry PhD students in or beyond their second semester of study are required to attend journal club (CHEM 6787 or problem seminar as appropriate). This requirement holds through graduation. First semester students are strongly encouraged to attend and participate. Students enrolled in this course will be required to make one presentation per semester enrolled, as well as contribute to discussion.