

# DEPARTMENT OF BIOCHEMISTRY

## GRADUATE PROGRAM GUIDELINES

This document describes the policies of the Department of Biochemistry regarding the granting of the Ph.D. degree. Since these policies are subject to periodic revisions, please keep a copy of this document to establish the rules in effect at the time of your admission to the Department.

### 1. Requirements for the Ph.D. Degree

- (a) A passing grade in all of the core and elective courses of the Biological Chemistry Program (BCP) or the Molecular Biology Program (MBP) (see "Requirements for Combined Ph.D. Program in Molecular Biology or Biological Chemistry" for listings). If a grade of less than a B- is earned in a core course, the student is required to retake the course and receive a B- or better. In addition, you must maintain an overall average of B or better.
- (b) A passing grade (B- or better) in a total of 1.5 semesters of additional graduate level courses approved by the student's Supervisory Committee, including at least one advanced seminar and one didactic course. In some cases a relevant undergraduate course may be approved.
- (c) Students are required to participate in the following activities throughout their association with the Department:
  - Biochemistry Department Journal Club (second year students only)
  - Biochemistry Department Research in Progress
  - Seminars sponsored by the Biochemistry Department
- (d) Laboratory rotations. See the "Requirements for the Combined Graduate Program in Molecular Biology or the Graduate Program in Biological Chemistry".
- (e) Accumulation of at least 14 credit hours of Biochemistry 7970 (Ph.D. Thesis Research).
- (f) Registration
  - (i) Students should register every semester as instructed by the Department in order to maintain eligibility for the Graduate School's tuition benefit plan.
  - (ii) During Fall and Spring Semesters, unless instructed otherwise by the Department, all students must register for Bioc. 7020 (Research in Progress) and the appropriate section of Bioc. 7040 (Lab Research Conferences). Second year students must also register for Bioc. 7010 (Journal Club).

(iii) Students must apply for Utah residency as soon as they are eligible, usually at the end of the second year of graduate work. This is a requirement of the Graduate School's tuition benefit plan and also saves the Department money should we be required to pay your tuition.

(g) Transfer Students

In unusual circumstances, graduate students may enter the Biochemistry Department without coming directly from one of the Combined Graduate Programs. Such students must be sponsored by a Biochemistry Department Faculty member and must also obtain the approval of a majority of the Core Biochemistry Department Faculty. In cases where the student has not yet taken the required graduate coursework or the Preliminary Exam, it is expected that the student will follow the Biochemistry Department Guidelines. In cases where the student is transferring from another graduate program, the student may petition to get credit for coursework and/or preliminary examinations that were taken elsewhere. These petitions are not granted automatically, however, and must be approved by a majority of the Core Biochemistry Department Faculty.

(h) Academic Misconduct

Issues of academic misconduct are taken very seriously. In order to ensure due process, anyone who suspects academic misconduct by a member of the Biochemistry Department should carefully follow the guidelines for reporting and evaluating academic misconduct. These guidelines are kept on file in the Biochemistry Department Office.

2. Supervisory Committee

This Committee administers the preliminary exam, advises the student concerning thesis research and presides over the writing of the thesis. This committee is **your** team and meeting with them through the years should be a positive, productive experience, not an adversarial one. **Students must have selected a 5-member supervisory committee by the beginning of Fall Semester in the second academic year (the first year in the Department).**

(a) You and your thesis advisor should form a Supervisory Committee, consisting of five members with the thesis advisor as the chairperson. Three members must have their primary appointments in the Biochemistry Department (this can include the advisor, but only if he or she has their primary appointment in the Biochemistry Department). At least one committee member must be from outside the Department. You must complete the "Request for Supervisory Committee" form, have all committee members sign it, then submit it to the Department Office for departmental and Graduate School signatures.

- (b) Upon satisfactory completion of the preliminary examination, you are formally a candidate for the Ph.D. degree in the Biochemistry Graduate Program.
- (c) **You are required to meet with your committee at least once a year before the end of Spring Semester until graduation.** New students in the Department will therefore take prelims during the **first** Fall Semester that they are in the Department, and then have their first committee meeting the Spring Semester immediately following their prelims. Students who joined the Department in 2008 or earlier may continue to hold their annual committee meetings in the fall, if they prefer, but must in any case meet with their committee by the end of Spring Semester. At least four of the five committee members must be present at each thesis meeting. If a committee meeting has not been held by the end of Spring Semester in a given academic year, the Biochemistry office will be directed to submit a grade of "incomplete" for all research courses. Failure to schedule a meeting in a timely fashion may result in more drastic measures, including withholding of stipends. More frequent meetings may be held if desired by the student and/or the Committee. **The student is responsible for scheduling these meetings, and for reporting their completion to the Department Office.** Following each year's meeting, you must submit a completed "Annual Supervisory Committee Verification" form to the Department Office.

### 3. Preliminary Examination

Please read carefully these guidelines for the Preliminary Examination. Note particularly the time frame, which is designed to be long enough to allow serious consideration of the proposed topics without compromising the student's progress in thesis research.

- (a) The preliminary exam will be conducted by your Supervisory Committee. Your thesis advisor will attend, but will not participate in the examination. The advisor should function only in an observational role and he/she should not comment on the abstracts or participate in the final evaluation of the written or oral proposal (except as requested by the committee). An examination chairperson should be agreed upon in advance from among the Advisory Committee (in consultation with that person and your thesis advisor). The chairperson's duties include ensuring that you understand the examination procedure and monitoring your progress during the exam period.
- (b) You must choose a **7-week** period **during Fall Semester your second academic year** in which to prepare and take the preliminary examination. You should try to minimize your other commitments (T.A., courses, etc.) during this period. **Failure to schedule your preliminary exam is not an acceptable excuse for delaying your exam beyond the end of Fall Semester.**
- (c) The general format of the exam consists of the submission of a scholarly original research proposal and an oral defense. The proposal should be in the general format of a grant application.

- (d) Proposal topics must be approved by your Examination Committee and this requires the submission of **two** abstracts (on different topics). You should realize that the selection of good original research topics and well-defined specific aims is half the battle. We are looking for: **1) Scientific Importance.** Clearly explain how and why your proposals address important aspects of fundamental problems in biochemistry, as broadly defined. **2) Originality.** The proposals should demonstrate an original approach to an important problem. We have been frustrated in the past when students have simply proposed to do the next obvious experiment(s) in a new system or to use one of the important tools of biochemistry (e.g., site-specific mutagenesis, crystallography, two-hybrid screen technology, etc.) to address obvious aspects of a problem. You may, of course, propose to use well-established techniques, but we want to see clear evidence that your proposals will offer some fresh new insight, model, or approach in solving your problem. **3) Definition and Feasibility.** You need to make it clear that you are proposing to do research that can actually be successful. It is therefore important to focus your ideas so that it is clear exactly what you propose to do and that you have considered possible pitfalls and reasonable alternative approaches. Assume that you have the resources of a principal investigator with a technician and 1-2 students for about 3 years.

The following format should be followed for the **two page** abstracts (single spaced):

Page 1: Background and Significance. Concisely describe what is known in the area of proposed research, what outstanding questions remain to be answered, and why they are of fundamental interest.

Page 2: Specific Aims. Typically, an abstract has 3-4 specific aims, each followed by a short paragraph outlining experiments that will allow this specific aim to be met.

During the one-hour abstract meeting, the student will present a brief outline of both abstracts with specific aims (~20 minutes each). At the end of the meeting, the committee will select one abstract for further development into a full proposal and provide feedback.

- (e) You are then required to write a full proposal. The proposal should be modeled on a research grant application and include the sections described below. Page limits are included for each section (1.5 spaced text; 12 point type, 0.75 inch margins, and includes all figures, which should be embedded within the text). **These are not minimal expectations, they are limits not to be exceeded.** It has been the experience of past committees that quality is NOT proportional to quantity; please be succinct.

**ABSTRACT (1 page):** This section should concisely summarize the main points presented in more detail in the proposal (e.g., what is the purpose of the study, why is it important, what is the general strategy, etc.).

**SPECIFIC AIMS (1 page):** You should provide a list of distinct specific aims that clearly define the goals of your proposal. Each specific aim can be followed by 2-3 sentences of clarification.

**INTRODUCTION (4 pages):** This section should provide sufficient background information to allow the Committee to understand the planned experiments and their significance (remember that they are not experts in the field). References to pertinent literature must be included.

**RESEARCH PLAN AND METHODS (12 pages):** This section must describe in detail the plan for attaining each specific aim. It should include the rationale for the experiment, description of experimental procedures (including methods), possible pitfalls and alternative strategies, expected outcomes, interpretation of the results, conclusions, and future directions. For the purpose of proposing future experiments, you may predict the outcome of proposed experiments, but you should also consider what approach will be taken if plausible alternative outcomes are observed. It is advisable to provide clear figures that help to clarify complex concepts, and it is also often helpful to provide informative “sketches” of expected results (although you should not create hypothetical figures that give the impression of presenting authentic data).

For each proposed experiment, you must state a clear question; the proposed experiment must address that question in a direct fashion; the potential outcome of the experiment must be interpreted in relation to the question; and appropriate controls must be proposed to ensure that the interpretation is valid. If the outcome of the experiment you envision will not resolve the stated question, drop that experiment and propose one that does.

**LITERATURE CITED** (no page limit).

**It is understood that the experiments included in the proposal should originate from the student.** You may check with the Committee chair about general questions, particularly if you propose to alter the direction of your proposals dramatically. However, the idea is that you (and not they) should be deciding what is important and writing the examination yourself. During the preparation of the written proposal the student is **encouraged** to discuss ideas and techniques or questions concerning the format of the written proposals with other scientists but **not** with Supervisory Committee members. In addition, **you should not discuss any aspect of your proposal with your advisor.**

- (f) You will defend your proposal in an oral examination. At the beginning of the exam, you will be asked to leave the room so that the Committee can discuss the proposals. You will then be asked to give a short (~20 min) formal presentation on your proposal. You should expect questions from the Examination Committee during and after your presentation. They will attempt to discover whether you are able (a) to demonstrate an understanding of the significance of the proposal with respect to the current state of knowledge in the field, (b) to demonstrate an understanding of both the theoretical and practical aspects of the methods and procedures in the proposal, and (c) to defend the rationale of the experimental designs and approaches.

Although the thrust of the questioning will usually focus on the proposal, inquiries of a more general nature can also be expected. You should therefore be prepared to answer questions concerning material covered in the First Year Curriculum Core Courses. A detailed recall of the material is not required but a firm familiarity with general principles is expected. **You are therefore strongly encouraged to review the material covered in the First Year Courses prior to the examination.**

The oral portion of the examination typically lasts for about 2 hours. When the examination is completed, you will once again leave the room so that your performance can be evaluated. A critical evaluation of the examination will then be given. A passing performance requires the approval of 3 of the 4 members of the Examination Committee. Students not performing to the satisfaction of the Committee on the written and/or oral part of the exam will either be failed outright or asked to address the deficiencies in any manner and schedule agreed upon by the Committee. If a student fails to pass the exam, he or she may be terminated from the Ph.D. program.

- (g) The following timeline for preliminary exams must be followed unless an exception is granted by the chairperson of your Examination Committee. **It is your responsibility to see that this schedule is observed. Failure to respond in a timely fashion will be considered inadequate academic progress and may be grounds for dismissal from the graduate program.** Remember that the **entire** examination, from declaration to oral exam, must occur within a 7-week period and that the exam must be **completed** by the end of **Fall Semester**.

#### **Preliminary Exam Timeline:**

**Day 1:** Student declares to the prelim committee chair, their thesis advisor, and the Department Office that they have started their prelim.

**Day 8 (or earlier):** Student submits two abstracts.

**Day 10-19 (or earlier):** Student presents both abstracts in a one-hour meeting. The committee will select one of the topics and gives the student feedback at the end of the abstract meeting.

**Day 44 (or earlier):** Student hands proposal out to committee.

**Day 49 (or earlier):** Student defends proposal.

- (i) You should now be reading the scientific literature and watching for suitable research topics. Keep a list.
- (ii) You should choose a Supervisory Committee by the beginning of Fall Semester and a 7-week period during that semester that will be relatively unencumbered. Both of these choices should be made in consultation with your advisor.
- (iii) The exam period begins when you declare your intention to begin the exam and obtain the agreement of the Examination Committee chairperson. You should not cease work in the laboratory on the pretense of beginning

preliminary exams until you have formally declared your intent to **both** your thesis advisor and Examination Committee chairperson.

- (iv) Within 1 week of the initial declaration, you must present the Examination Committee with the two proposal abstracts. At the end of the meeting (if the abstracts are acceptable) the committee will tell the student which proposal to pursue and provide instructions concerning discrete directions to develop.
- (v) The oral exam **must** occur within 7 weeks of the initial declaration (~5 weeks after proposal topics are accepted). A range of acceptable dates will be established when the topics are accepted. Please be aware of the potential for conflicts in scheduling a meeting of 5 faculty members; **do not wait until the last minute to attempt to schedule the exam.**
- (vi) The written proposal must be submitted to Examination Committee members at least 5 weekdays prior to the scheduled exam. It is your responsibility to find a time that is suitable, schedule a room for the examination (typically an EEJMRB conference room), and to deliver copies of the proposal to the Committee members. When making these arrangements, don't forget your thesis advisor, who must be present at the examination.
- (vii) The Report of the Qualifying Exam form must be signed by the committee members. It is most convenient to bring this form to your preliminary exam. After you obtain your committee signatures, submit the form to the Department Office for Graduate School approval.

#### 4. First Supervisory Committee Meeting

Your first supervisory committee meeting must take place **before** the end of **Spring Semester** of your **second** year in the graduate program (first year in the department). This meeting is unique in that you must provide a Research Plan describing your thesis research and summarizing your progress to date. This document should follow the same format as the Preliminary Exam Proposal (see 3e, above), except that you should split the “Research Plan and Methods Section” (10 page limit) into two 5-page sections entitled “Preliminary Results”, and “Research Plan”. The Preliminary Results section should describe what you have accomplished to date, and the Research Plan should describe what you plan to accomplish.

##### Research Plan Format

Abstract (1 page)  
Specific Aims (1 page)  
Introduction (3 pages)  
Preliminary Results (5 pages)  
Research Plan (5 pages)  
Literature Cited, Tables, Figures (no page limit)

Please follow these guidelines in preparing your Research Plan:

1) As you prepare and write your Introduction, state clearly the significance of your research in the context of the established facts in the field and the innovation of your approach. You should also include descriptive figures and schemes to aid in understanding the project.

2) You and your thesis advisor should use the process to discuss and refine your future research plans.

3) The Research Plan should also provide a mechanism for getting feedback on your formal scientific writing style. We therefore advise you to discuss your plans with your advisor, write a complete draft of the Research Plan yourself, and then give it to your advisor (and others) with sufficient lead time so that he/she can critique the document and you can complete a rewrite before handing it out.

4) The document itself is intended to educate your Supervisory Committee on your project, and also to provide them with the opportunity to give you feedback on your plans. It is therefore essential that you distribute the document at least 5 weekdays before your Supervisory Committee meeting.

5) Finally, the document will serve as the basis for the oral presentation at your first Supervisory Committee Meeting.

Please prepare well and take this process seriously. The format is intended to provide everyone with a chance to assess your progress, help shape your future thesis research, and provide you with formal feedback on your writing and oral presentation skills. Although your first Supervisory Committee Meeting is not intended to be an exam, you may be required to rewrite the document if it is deemed inadequate. Moreover, in extreme cases, where very little scientific progress has been made or other major problems are evident, that the Supervisory Committee can recommend that the student pursue a Masters rather than Ph.D. degree.

## 5. Teaching Assistantships and Teaching Duties

The Department funds student stipends in several ways, including research grants, training grants and individual fellowships. In order to preserve equity, all students are required to teach equal amounts, regardless of the source of their individual stipends. The present requirement is 1 semester of assisting. This requirement should be completed by the end of the third academic year (the second year in the Department). Teaching assistant assignments are coordinated through the Biology Department.

## 6. Time Limits

- (a) It is expected that students will have completed the requirements for a Ph.D. degree within 5 years of entering Graduate School. Upon completion of the student's fifth year in graduate school, the student and his/her Supervisory Committee must meet to assess the student's progress and establish a tentative written timetable for completion of the thesis. The written timetable must be distributed to the student, all members of the Supervisory Committee, the Department Chair, and the chair of the Graduate Committee. The chairperson of the Supervisory Committee is responsible for calling this meeting.
- (b) As required by the Graduate School, a time limit for full completion of the Ph.D. program is set. After seven full years in the program (since the first matriculation), the student is no longer permitted to continue in the Ph.D. program. Short extensions (usually no more than one semester) can be recommended by the Graduate Committee for approval by the Dean of the Graduate School. Special cases involving leaves of absence and transfer students will be dealt with by the Graduate Committee.

#### 7. Program of Study

Three (3) months before the start of the semester in which the student anticipates conducting the oral thesis defense, he/she must submit a "Program of Study" form to the Department Office for approval and submission to the Graduate School. The document is a complete list of your courses and thesis research credits during your doctoral work and is signed by each member of the Supervisory Committee.

#### 8. Thesis Writing and Defense

- (a) The thesis must conform to the university rules governing such matters, and the Supervisory Committee will have discretion on other matters concerning content and form within the university limits. There is a university Thesis Editor, and a publication from that office is available to assist the student.
- (b) The Supervisory Committee and student will determine when the student should begin writing the thesis. The thesis must be presented to each member of the Supervisory Committee at least 1 week prior to the date of the oral defense.
- (c) After the thesis is written, the student will give a one-hour seminar on the thesis research, at a location and time convenient for attendance by the general community. After the seminar, the Supervisory Committee and student will meet for the "Report of the Final Examination," the results of which are forwarded to the Graduate Committee, and subsequently to the Department Chair and the Graduate School office.
- (d) The university requires that "the candidate must be regularly enrolled for three or more credit hours during the semester in which the final oral examination is taken."

9. Compensation

- (a) The Department is committed to paying a stipend to each student, plus health insurance and full coverage of tuition expenses as long as the student is in good standing and has the sponsorship of a thesis advisor within the Department. The stipend is \$25,000 for the 2009-10 academic year.
- (b) The student is expected to devote full effort toward graduate studies while enrolled in the program. It is not permissible for a student to work at another job nor to be enrolled in another educational program. A variety of student loans are available to ameliorate cases of financial hardship. If a student wishes to gain professional experience outside the department, for example, in teaching, explicit permission must be obtained from the thesis advisor and the department chair, with the understanding that the primary role of the departmental program is research training.

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