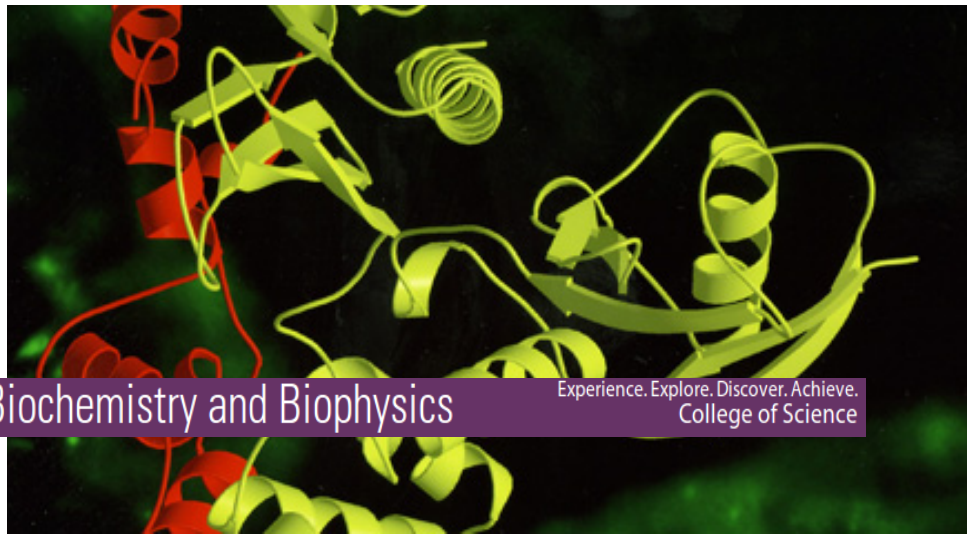

WWW: ***BB Home***

Graduate Student Handbook

Our mission in Biochemistry & Biophysics is:

- to carry out significant original research that reveals the molecular mechanisms underlying life of all varieties and that provides excellent training for undergraduate students, graduate students, and post-doctoral fellows;

- to provide excellent classroom and laboratory training of both major and non-major undergraduate students at Oregon State University and in so doing prepare them for success in their chosen careers and in life.

In carrying out our mission, the Department of Biochemistry and Biophysics is home to about 160 undergraduate majors and 30 graduate students. We grant B.S., M.S. and Ph.D. degrees. Our faculty oversee research funded by grants and contracts of ~$4 million annually. Our Biochemistry & Biophysics undergrads are among the best at OSU, as about 75% of all Goldwater Scholars at OSU since 2004 have been BB majors.

Contents

Appendix

1. **Rotation selection form** (fill in three proposed mentors and return the form to Graduate Advisor during first week of classes Fall term of Year 1)
2. **Rotation evaluation form**
3. **Teaching evaluation form**

1. Contact information

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2. About the Graduate Program

The graduate program in the Department of Biochemistry and Biophysics at Oregon State University grants primarily doctorate (Ph.D.) degrees, but also offers thesis and non-thesis Master of Science (M.S.) degrees. We offer a broad range of research topics through the core faculty within the department, those associated with the Linus Pauling Institute, and affiliate Adjunct Faculty from other departments throughout the OSU campus.

Research interests of the faculty in the graduate program include aging, amyotrophic lateral sclerosis (ALS or Lou Gehrig's Disease), atherosclerosis, bioinformatics, biosensors, cancer biology, chemical biology, cell signaling, computational biology, DNA and histone modifications, epigenetics, membrane protein biochemistry, micronutrients, mouse transgenics, oxidative stress, protein and nucleic acid structure and function, production of secondary metabolites, protein engineering, and transcriptional regulation by nuclear receptors.

The department is one of nine academic departments in the College of Science. Research in the department is supported by over $4 million dollars annually from external grants. The department is well equipped with research facilities that include confocal and laser dissection microscopy, flow cytometry, X-ray crystallography, NMR, mass spectrometry, in-house access to high-throughput DNA sequencing, analytical centrifugation, and computational resources, and is supported by additional facilities and staff in the Environmental Health Sciences Center and the Center for Genome Research and Biocomputing.

Oregon State University is a broadly based public institution enrolling about 25,000 undergraduate students. It is one of only two U.S. universities holding Land, Sea, Sun and Space Grant status. Accordingly, the university has developed strong programs in the sciences, agriculture, oceanography, and forestry. The main campus is located in Corvallis, a college-oriented city of about 60,000 inhabitants in the lush Willamette Valley. Corvallis is a short drive from both the Oregon Coast and the snow-capped Cascade mountains.

3. Admission to the Graduate Program

Students wishing to be admitted to the Department of Biochemistry and Biophysics at Oregon State University must apply via the OSU Graduate School webpages: http://gradschool.oregonstate.edu/programs/5060

- A complete application for domestic applicants consists of:
  (1) a completed application form,
  (2) the applicant's narrative “Statement of Purpose”,
  (3) the applicant’s CV,
  (4) three letters of recommendation (on letterhead stationary submitted by the referees),
  (5) transcripts of all college-level academic work, and
  (6) scores in the Graduate Record Examination (GRE).

International applicants must fill out a form regarding financial support (“Financial Certification”) and supply scores for TOEFL or IELTS tests.

- A successful applicant will have a cumulative GPA of at least 3.2 (on a scale of 4). Typically we admit students who have a combined GRE aptitude score of 300 for Verbal, Quantitative (2011 scoring), and 3.5 for Analytical, or will present comparable evidence indicative of probable success in graduate school. Foreign applicants must score 100 or better on the Test of English as a Foreign Language (TOEFL) and 7 on the IELTS.

- To be admitted a student should hold a bachelor's degree in chemistry, physics, or a biological science. A typical applicant will thus have completed at least one year of physics and chemistry, organic chemistry, physical chemistry, biology, and mathematics (through calculus).

- Graduate students accepted into the Ph.D. program are offered financial support.

- The annual application deadline is December 15, but later applications will be considered if positions remain available.

- GRE and TOEFL codes are as follows: GRE-University 4586, Dept. 0202 or 0222; TOEFL-University 4586, Dept. 34 or 36.

4. BB Graduate Program Core Curriculum

First year courses to be taken by all students:

Fall	Winter	Spring
BB581 Biophysics 1 (3)	BB582 Biophysics 2 (3)	BB583 Biophysics 2 (3)
BB590 Biochemistry 1 (3)	BB591 Biochemistry 2 (3)	BB592 Biochemistry 3 (3)
BB607 Seminar (1)	BB607 Seminar (1)	BB607 Seminar (1)
BB601 Lab rotation research (5)#	BB601 Lab rotation research (5)	BB601 Lab rotation research (5)

#Credits for each class are shown in brackets. Select number of lab rotation research credits so that total number of credits equals 16 (usually 9 credits).

Usually students do not have time to take elective classes during the first year as they will take core classes (successful completion of which will constitute part of their preliminary examination), do required lab rotations and teach, which will not allow time for additional classes.

For electives to be taken in **Year 2** and **Year 3**, please see our course offerings online. After **Year 1,** instead of BB601, students will register for BB603 – Graduate Thesis. When registering the total number of credits should equals 16 during Fall, Winter and Spring term. If the graduate student is on a stipend (as opposed to hourly pay) during the summer they should register for 9 credits of BB603 for the Summer term.

Every student from Year 1 to Year 4 signs up for BB 607, but watch out because there are three different choices in the online catalog, depending on your year:
-1st year: enroll in SEM/1st Year Grad seminar (Fall, Winter, Spring - required!);
-3rd year: enroll in SEM/Dept Res Sem (the term you give your 3rd year talk - required!)
-2nd and 4th year: Session labelled SEM/Journal Club (Fall and Winter – regardless of whether your are presenting or not).

For the Ph.D. program, 108 total credit hours are required, 36 credit hours of which must be non-blanket courses (i.e., non-research, non-seminar courses). For more information see the Graduate School program forms.

Other useful links:

Summary of BB programs

Graduate School information and Catalog of Classes

Policies governing M.S. degree programs

Policies governing Ph.D degree programs

Use this link to access updated Graduate School forms.

5. Graduate Student “Survival Guide”

This Biochemistry & Biophysics guide extents and complements the Graduate School's survival guide with a focus on the specific policies and culture of the Department of Biochemistry and Biophysics to help facilitate the timely completion of graduate training. The guide is presented in chronological order, so that students and faculty can easily check off appropriate bench marks accomplished while passing through the various stages of the student’s graduate career at OSU:

5.1. Introduction

This “survival guide”, now formally called the Graduate Student Handbook, was assembled to help graduate students prepare for and during their time at OSU while pursuing an advanced degree (the M.S. or Ph.D. degree). In addition, it formalizes many of the requirements and expectations of the student by the faculty of the Department of Biochemistry and Biophysics.

Much of the information in this guide had previously been disseminated among students by "word-of-mouth" and thus varied according to the specific mouth from whence it came. The guide is attempting to standardize the information available to all students.

At the same time, the guide also serves to remind the faculty of what students should be doing as they progress through the program.

5.2. The First Year

5.2.1. Funding: Fellowships/Financial Support

Students accepted into the doctoral program receive financial support in the form of teaching and research assistantships. Graduate students typically receive a twelve-month stipend of $24,000, a full tuition waiver, and a medical insurance plan that also includes dental and vision coverage.

In addition, several graduate students in the department have been awarded pre-doctoral fellowships from the University (e.g. the OSU Provost Distinguished Graduate Fellowships or OSU Provost Distinguished Graduate Scholarships), from the Achievement Rewards for College Scientists Foundation, Inc. (ARCS), or funding agencies such as the American Heart Association (AHA), the National Science Foundation (NSF) and the National Institutes of Health (NIH). If you want to know more about these opportunities please contact Michael Freitag (freitagm@onid.orst.edu).

5.2.2. Lab Rotations: Expectations and Responsibilities

The purpose of laboratory rotations is two-fold. First, they expose students to a broad range of research topics and research environments available in the Department of Biochemistry and Biophysics. Secondly, they allow students and faculty to decide who

will mentor a specific graduate student. The core and affiliated faculty represent a diverse group, with research interests ranging from cell biology to molecular biophysics. Upon entering graduate school, many students will not have been exposed to all potential research topics and thus may not really know what is interesting to them and what is not, or which projects are reasonable for thesis research and which are not. Students complete three term-long rotations in their first nine months at OSU. Rotations should be generally agreed on or planned by the beginning of Fall term (see form Appendix 1), but changes are allowed.

Faculty members run their laboratories in distinctive ways. Labs may be large with many postdoctoral research associates, technicians and/or undergraduate students, or they may be smaller with primarily graduate students responsible for much of the research in the lab. The mentoring professor may by intimately involved in all aspects of research and may actually work in the laboratory, or may be more distant from the lab, primarily functioning to define the broader research goals of the lab and as a fund raiser. Each student needs to find out which style may be more appropriate for them. Lab rotations allow students to "try out" laboratories and, similarly, allows labs to evaluate prospective students. One important component of finding a mentor and lab for thesis research is how well students mesh with the people in the lab.

The most successful lab rotations occur when students maintain good communication with the professor. Students need to find out what they are expected to accomplish during the rotation, and by what standards their performance will be judged. This topic should be discussed with the professor even though rotation students are often directly supervised by a postdoctoral associate or a senior graduate student. In these situations it is in the student's best interest to clarify the chain of communication and responsibility. This initial understanding should be revised as the rotation progresses, since research projects usually take unforeseen turns. During a rotation, students should also try to learn as much about all the different currently ongoing research projects from other members of the group. This generally requires communication with all members of the research group, as well as attendance of all group meetings or journal clubs held by the laboratory.

At the end of a student rotation, professors are required to complete a form evaluating the student's performance (a copy of the evaluation form can be found as Appendix 2 at the end of this Handbook and online here). This evaluation is discussed with the student and the form signed by the professor and the student. Evaluations become part of the student's record and are considered during the general evaluation of each student at the end of their first year in the department.

5.2.3. Teaching Responsibilities

Regardless of the source of monies that fund their time in the graduate program, all doctoral students in the department have teaching responsibilities, as teaching is considered a major part of graduate training. Most students will be Teaching Assistants (TAs) in each of the three terms of their first year. In rare instances, teaching responsibilities may be delayed until later (e.g. if a student wins a prestigious OSU

Provost Distinguished Graduate Fellowship). Finally, depending on how a student's graduate education is funded after the first year, a student may be assigned additional teaching responsibilities in lieu of Research Assistant (RA) funds.

We would like to stress that teaching is an exceptional learning opportunity, and should not considered a "necessary evil". To properly teach any course, one needs to know substantially more about a topic than the students one educates. Thus, often an instructor will learn more by teaching a course than a given student will learn from taking the same class! Students may thus want to volunteer for additional teaching, if that is the primary reason for getting a higher degree. It should be stressed here that this must be discussed with the mentoring professor *BEFORE* students sign up as TAs.

At the end of each TA assignment, professors are required to complete a form evaluating the student's performance. A copy of the evaluation form can be found as Appendix 3 at the end of the handbook and online here. Evaluations are discussed with the student, and signed by the professor and the student. Like the rotation evaluations, TA evaluations become part of the student's record and are considered for the general evaluation after the first year. In addition, each TA will receive feedback from students taking the class in the form of standardized "Student Evaluation of Teaching" (SET) surveys.

Teaching duties for each term are assigned by the Department Chair. Students are informed of their assignments and encouraged to contact the class instructor early.

Teaching falls into two categories, lecture courses and laboratory courses. As a TA, you have responsibilities that are general for all courses and that are specific to certain courses.

5.2.3.1. Graduate students assisting in teaching (TAs) are required to:

1. Meet with the instructor(s) responsible for teaching the class. This should be done at least one week prior to the start of the term. If TAs plan to be out of town until the start of the term, they should contact the instructor(s), ideally prior to leaving.

2. Obtain a syllabus for the course. This outlines the basic information concerning the course (instructors, text used, chapters covered, exam dates, etc.).

3. Obtain an outline of subjects and material to be covered in the course. Most of this should be in the syllabus. In some cases, the instructor will have a specific set of class notes, but not always. If a course is taught by more than one instructor, TAs need to find out what topics each instructor will cover.

4. Determine the grading protocol and standards. How will the course be graded (exams, quizzes, problem sets, lab reports, lab notebooks, etc.)? Will deliverables be graded on a B average or C average? Will grades be strictly from the total points each

student earns, or will it be curved? These are questions that the students who take the class will ask the TAs.

5. Obtain instructions for how to instruct students in a specific class. What is a TAs part in instructing? What are the responsibilities of the TAs (e.g. recitations, office hours, proctoring exams, grading, etc.)?

6. Set office hours and location. In most classes, TAs are the first contacts for helping students on a one-on-one basis. TAs need to set office hours and BE PRESENT DURING THE TIME AND AT THE PLACE INDICATED. Typically these times are added to the syllabus or class information that the instructors make available to students on the Blackboard web pages for the class. TAs need to tell Barbara Hanson in the departmental office what their office hours are and where their office is located. TAs need to make sure the enrolled students get this information. Most instructors require at least two hours per week of office hours from TAs. If TAs cannot be available for office hours they must let the instructors know at least a day in advance.

7. KNOW THE MATERIAL!! This cannot be stressed enough. One cannot teach unless one is more knowledgeable than the students. For this, TAs also need to know how instructors are presenting the material, and what they think is important for students to know. If TAs do not understand the material or how the instructor is presenting the material, it is useful to sit in on some lectures to develop a sense of the instructor's teaching style.

5.2.3.2. Teaching in a lecture course:

When assigned to a lecture course, TAs will primarily be responsible for helping students during recitations and office hours with their problems, as well as grading and proctoring exams. TAs need to:

1. Be prepared to participate in the grading. TAs need to know when all the exams are given AND communicate with the instructor as to when to meet to start grading, when grading must be completed, and who grades what parts of the exam.

2. Prepare and present material in the subject outline during recitation. Each instructor has ideas as to how recitation should be run. TAs should abide by their preferences. Usually, there will be problem sets to review during recitation. TAs should get these in advance and complete them on their own. If there are any questions about answers or how the problem is to be solved, TAs must ask the instructor for assistance.

3. Be aware of grading policies. Corrections to grading (due to errors or perceived errors) are the final responsibility of the instructor.

4. COMMUNICATE ANY TIME CONFLICTS WITH THE INSTRUCTOR! This is important in terms for proctoring, grading exams, and assigning recitation sections.

5.2.3.3. Teaching in a laboratory course

When teaching in a laboratory course, TAs have a different set of responsibilities. As laboratory classes (BB 493/494) are taught by different instructors each term, the responsibilities of the TAs vary from term to term. Thus, the first responsibility is to contact the instructor to clarify expectations and obligations of TAs. This is also a good time to decide how much "teaching" TAs are expected to do in working with the students who are registered for the course. If two TAs are assigned to the course, they need to meet the other TA to work out the shared and individual responsibilities so that the needs of the class are met, and the responsibilities are EQUALLY shared. In general, TAs in the teaching lab courses are required to:

1. Obtain a key to the teaching lab (ALS 0023).

2. Prepare reagents and equipment in a timely manner for experiments assigned for the course. TAs need to keep a brief written record of reagent preparation in a permanent notebook.

3. Stock reagents and supplies (Kimwipes, Parafilm, pipet tips, etc.) that are used in the day-to-day functioning of the lab. This may also require placing orders for supplies and chemicals, and the instructors can help with this as needed. TAs maintain a supply of purified water. All of this must be done LONG BEFORE the lab runs out of these supplies. If there are not enough materials for the students to perform assigned experiments, then TAs failed in their jobs.

4. Maintain equipment and supplies so that subsequent users will find these materials, and find them in working order. TAs are not expected to, and should not, repair broken equipment, but should notify the current instructor or the main office when repairs are needed.

5. Be aware of safety. This is everyone's concern (the instructor, the TAs and the students). This includes environmental as well as personal safety.

6. Clean the laboratory at the end of the term, including the proper disposal of unnecessary reagents and student samples, and storage of equipment no longer in use. TAs properly dispose of all broken glassware and generally leave the lab in good working condition for the next term. It would be helpful to assemble a file of handouts, midterms, etc. to be available for future TAs responsible for the lab courses.

5.2.4. First Year Seminar Series

All BB graduate students must take the first year graduate seminar series (one class credit per term, classes on Monday, seminars on Wednesday), and they are expected to attend a Journal Club series (usually Friday) organized by the more senior graduate students, in which the second year students present interesting new papers for discussion by the whole department.

The formal seminar series in combination with the student section of this class presents an opportunity for graduate students to learn the mechanics of how to give short research talks (i.e. for rotation talks at the end of each of the first-year quarters) and how to present their research to an audience. Other than doing excellent bench, computational or theoretical work, the ability to communicate is the most important skill to learn during graduate training. This includes written AND oral communication. In other words, you may be doing Nobel Prize-worthy research, but if you cannot communicate this to the world at large, nobody will know. The seminar series helps graduate students to learn from the example of others, usually top-notch scientists, and it will hone their presentation skills in a friendly atmosphere. At local, regional, national or international meetings or conferences, graduate students will have the opportunity to present their work to a more critical group.

During the first week of the fall quarter, many of the department faculty members give 30-minute presentations of their research program to incoming students ("BB Fall Symposium"). These presentations are generally very useful to help determine rotation labs for new students. Graduate students should also analyze the style and method used by faculty members to present their own work (i.e., they should note which techniques work and which do not).

All first-year graduate students in the department (regardless of the program, i.e. BB, MCB, or BPP) give 15-minute presentations on their rotation project after each quarter ("Rotation Talks"). These talks are usually scheduled for the Friday of the last week of Fall, Winter and Spring term and the whole Department is in attendance.

5.2.5. Departmental Seminars

The department sponsors a seminar (Wednesday, 3:30 pm, ALS4001) every other week of the regular school year. All faculty and all graduate students are expected to attend these seminars even though no credit is given for attendance. First-year students *MUST* attend as they take the first year seminar class (BB 507/607) for credits.

The seminar speakers are experts in their field, who are invited from other institutions by faculty members or fourth-year graduate students (annual "Tsoo King Lecture"). The second and third year students select the "Annual Alumni Speaker" from the base of BB undergraduate and graduate alumni. The remaining seminars consist of "third year seminars" that are given by graduate students roughly at the halfway point in their programs.

Graduate students are expected to be able to ask questions at the end of seminars, especially if the speaker works in their area of research. There is also a "reception", a coffee and cookie social gathering, in the department library (ALS2009A) following each seminar, where students have the opportunity for lengthier and more in-depth discussions with the seminar speaker.

5.2.6. Additional Seminars

There are additional seminar series available both inside and outside of the department and university. Notices of these are posted on the board outside the main office and are also distributed by e-mail. These include the seminar series of the Center for Genome Research and Biocomputing (CGRB), the Linus Pauling Institute (LPI), the Department of Chemistry, and the Department of Physics.

There are also several formal or informal Journal Clubs available on campus, e.g. the BB Journal Club (once a month), the Molecular Biology Journal Club, and other journal clubs for various topics. These are less formal presentations of work ongoing at OSU or at other institutions, where questions are asked of the presenter during the talk. Attendance at these is optional, but generally useful to help broaden science perspective outside the immediate department.

5.2.7. The First Year Review

After Spring term of the first year, graduate students will be reviewed by the faculty as to their potential to continue towards a higher degree. This evaluation encompasses student performance in the classroom, in research (primarily during laboratory rotations), and in teaching (see Teaching Responsibilities above). ***The continuation of the student in the degree program is dependent on performance in all three of these areas AND success in securing support from a mentoring major professor***, with whom the student plans to carry out doctoral research, and from whom the student expects to receive support for a substantial amount of time while in the department.

It should be noted that the graduate school and department set a B grade (3.0) as the cutoff for passing a course in good standing. Thus grades below B (i.e. B- and below) earned by a student in the first year are viewed unfavorably. ***Earning two such grades normally terminates candidacy for the Ph.D.***

5.3. Beyond Year One But Before Obtaining a Degree

5.3.1. Selecting a program committee

5.3.1.1. Ph.D. candidates

Once accepted into a lab, graduate students need to assemble a committee of five faculty members to help guide them through their graduate career. It is advisable to discuss your choices with the mentoring major professor. This committee usually consists of the major professor (who also serves as committee chair), two additional core or affiliated department members, one faculty member from another department who is interested in your research, and a Graduate Council Representative (GCR) chosen by the student from a short list assigned by the Graduate School. This committee should be assembled for its first meeting no later than during Fall term of Year 2.

The first meeting of graduate committees serves to introduce the student's current and proposed research, and to plan the remaining coursework to be completed as part of the Ph.D. program. The most effective meetings occur when a 20-minute presentation of student objectives, initial research progress, and proposed future research are followed by discussions of the research, and about which classes are most appropriate to achieve the proposed research goals. These meetings are NOT exams, yet students should be well prepared and likely have rehearsed their short presentation. It is advisable to prepare handouts for all committee members and even be ready to supply pdf files of the presentation as a record for committee members who may want to stay involved with the research.

Gathering five faculty members in one place at one time for two or three hours will require lots of preparation. Students should plan the meeting at least one month in advance and send reminder e-mails one week and one day before the planned meeting. They should reserve the BB conference room (ALS 2040) or library (ALS 2009A) for the meeting at least two weeks in advance (and notify committee members of the location).

Students should have the Ph.D. program forms (see page 6 and below) filled in before the meeting is scheduled with the Graduate School; it's advisable to consult with the mentoring major professor. ***This first meeting is one of three that MUST be scheduled with the Graduate School at least one week in advance of the meeting date (the other two are the preliminary and final exams).*** After the meeting, the Department Chair must approve programs by signature before the forms are submitted.

It is the graduate student's responsibility to:

-obtain all necessary forms,
-fill them out properly (guided by the major professor), and
-submit the signed forms to the Graduate School.

For acceptable forms to be used in preparation of the committee meeting, updated Grad School forms can be accessed here. Signed originals of the program forms (a copy should be kept by the student and major professor!) must be submitted to the Graduate School, which is located on the third floor of the Kerr Administration Building (across the street from Valley Library).

Graduate committees will meet at least two more times. The second meeting will be for an oral preliminary examination, and the third, and last, will be for the private part of the thesis defense (or final oral exam). Committee members will get to know about the graduate student's scientific progress and potential through these meetings and the dissertation (or "thesis"). They will then be in good position to write the critical letters of recommendation that a newly minted Ph.D. needs to advance to the next stage of their science career, in either

academic or industry research or teaching. Needless to say, students should strive to perform well during all meetings and remain on good terms with all committee members.

5.3.2.2. Master of Science Candidates

A graduate committee is required, but the make-up of this committee is different from that of a Ph.D. candidate, and it is different for a "thesis" *versus* "non-thesis" degree. For a non-thesis degree, the committee is composed of three faculty members of the department. For a thesis degree, the committee is composed of three faculty members and one Graduate Council Representative from a short list assigned by the Graduate School.

5.3.2. Preliminary Examination

Only doctoral students take this examination. This is an oral examination of at least two hours in length and equivalent to what is called "qualifying examination" at other institutions. ***It MUST be passed by the end of the Fall term of the third year to remain in good standing in the PhD program.*** At this point a student will usually have successfully completed most of the coursework in the program of study. After passing this examination PhD students are also referred to as "candidates".

In preparation for the exam, you must submit to each committee member a written thesis proposal that describes your thesis problem, summarizes research progress to date, and outlines research strategies for the goals yet to be attained. ***The quality of this written document is evaluated and is part of the examination.*** The thesis proposal is not a contract for what must be accomplished during the Ph.D. program, but it should be a cohesive research proposal that defines the research topic to be addressed and presents a plan for research that is well-reasoned and defensible based on what is known at the time, and that is of a scope reasonable for a Ph.D. thesis. Although some of the ideas and approaches presented in the proposal may have come from your advisor or others (typical of the collaborative nature of science), it is essential that the proposal is written in your words and that it covers material over which you have intellectual ownership. In preparing the proposal, you may have your advisor and other students read rough drafts and provide feedback, but the writing should be yours. The purpose of the preliminary exam is for the committee to assess whether you give evidence of mastery of your proposal subject and to show that you have the intellectual and organizational abilities to succeed in doing research at the Ph.D. level. This includes being able to define a problem, research the topic, design a research strategy, and carry it out and interpret the results effectively. The proposal also could provide an excellent starting point for a fellowship application (but that is independent of the examination).

Similar to fellowship applications, the proposal should be organized as follows: (1) summary of the proposal, including a statement of the specific aims (1 page maximum) and (2) main body of the proposal organized into three sections (Significance,

Innovation, and Approach; 9 page maximum). Figures are included in the 9-page maximum, but references are not included in the page limit. The font should be 'Arial 11' for all main text and can be 'Arial Narrow 10' for figure legends. These minimal specifications mirror what is expected for Research Plans for NIH pre-doctoral applications or proposals for private foundations.

The "prelim" or "thesis" ***proposal must be submitted at least one week before the scheduled date of the exam, ideally as an electronic text file and a printout (in the mailboxes of the committee members)***. At the exam, it is expected that all committee members have read the proposal, and so an extensive research presentation is not necessary. Talk with your advisor about what the exam will be like and how they would like you to start it. Typically you will be asked to give a 5 to 20 minute opening presentation to guide the committee through the context and importance of the problem being addressed and the main aims to be pursued while distinguishing briefly what you have already done as opposed to what remains to be done. Unlike a seminar, your presentation will be interrupted by questions from the committee members (and may never be completed during the exam). As the presentation continues or after it is completed, a common process is for committee members go through a few rounds of taking turns in asking whatever questions they would like, with other committee members chiming in with related questions or comments.

The first part of the oral exam is focused on the student's research project and related areas. For instance, a student working on gene cloning should understand all aspects of DNA biochemistry, structure and function, as well as gene expression as represented in part by content of advanced courses taken by the student. Whatever your topic, in additional to technical knowledge about methodology you should also be knowledgeable about the biological context and significance of the project and the relevant literature, as well as being able to justify how the chosen aims and research strategies are appropriate for the problem, what kinds of results might be expected and how they would be interpreted, and what might be limitations of the chosen approach and/or alternate approaches to achieve the aims. This part of the exam is used to assess the your ability to plan and conduct research, to think critically and creatively about questions in your area of interest, and to be aware of current and recent research literature in these areas. The second part of the exam will encompass general questions in the broader area of Biochemistry and Biophysics; this will include all coursework you have taken at OSU. The advice here is to prepare, prepare, PREPARE both in terms of timely and careful preparation of your thesis proposal, as well as key topics covered in your coursework, especially any of them that were taught by your committee members. It is generally useful to work with your major professor and the other members of the research group to discuss and practice answering questions concerning your work. They know this material better than anyone else (other than yourself, hopefully).

When the committee members have no further questions, the student will be asked to step outside. At this point the Graduate Council Representative leads a discussion focused on evaluating the student's performance and each committee member votes either "pass" or "fail." If there are zero or one "fail" votes, the exam is passed. If there is

more than one “fail” vote, the exam is not passed and the committee discusses about whether to allow the student to retake the exam and if so under what conditions. After these deliberations are complete, the student is invited back in to hear the results.

There are specific rules for the preliminary exam, laid out by the Graduate School. ***You must adhere to the schedules!*** The preliminary oral exam must be scheduled during periods when classes are in session (including finals week). A three-hour block of time should be reserved (the minimum time for a preliminary exam is two hours according to Graduate School rules), but it is best to make sure the room is available for longer. ***Reserving a room for the exam is part of your responsibility.*** As you must allow plenty of time to coordinate a meeting time with your five committee members, start the process of setting a date and reserving a room at least 2 to 3 months in advance. If there are time conflicts with one or more of your committee members, you may petition for a replacement. As soon as the date and time have been chosen, notify the department and the graduate school. This ***must*** be at least ***one week*** in advance of the exam date. As noted above, the thesis ***proposal must be provided to your committee at least one week in advance*** of the examination.

5.3.3. The Third Year Seminar

Third year students in the Ph.D. program get an opportunity to present their research achievements and further research plans during this seminar. This will also give them a chance to answer questions from all members of the department concerning all aspects of their work. This is a great opportunity to do a “full-length” seminar talk (i.e. a total of 60 min, ~45 min will be the actual presentation, 15 min of questions and discussion), something that does not occur often before the final thesis (“defense”) seminar.

The third year seminar must be scheduled at the beginning of Fall term with the faculty member in charge of the seminar program for any given year (“seminar chair”). During the quarter that a student presents, the student should register for BB 607 (see page 6). The seminar title must be submitted to the seminar chair and the staff in the departmental office several weeks in advance of the seminar so that fliers can be distributed.

5.4. The Final Year

5.4.1. Thesis

The thesis (or dissertation) is a detailed description of a student’s research in the department and “presented in partial fulfillment of the Ph.D. degree”. It is considered an official publication, thus it must be substantial, verifiable, defensible, and presented in a logical and understandable fashion. It is up to the student and the major advisor to determine (or “negotiate”) when each student is ready to write a final draft of the thesis. A good rule of thumb is that once a student becomes "the world expert" in a well-defined specific field, and is ready to tell the world (or at least others at OSU) that this is the case, this student is ready to defend a thesis.

In many cases, the chapters in a thesis will be composed of papers that have been published or are submitted to journals. In cooperation with the major professor it is determined what parts of these publications are to be included in a thesis. Ongoing work is often included in an Appendix. It is completely appropriate to present experimental approaches in more detail than for a typical scientific paper (the thesis is a repository of knowledge for the lab and for students who will follow). It is also appropriate to mention approaches that “did not work”, or results that would not even be supplemental data in a normal published paper.

The way a thesis looks is defined by the OSU Graduate School and can change over time. It is best to consult the guidelines before students begin the final formatting; please see the Online Thesis Guide (PDF). Students *MUST* follow the guidelines in this pdf. The copy of the thesis that is submitted to the committee and the Graduate School prior to the final exam is called the “examination copy”. This is not meant to be a rough draft. It should be the almost finished, final copy before the committee recommends changes. The idea is that only minor additions or changes should be necessary at this point.

Students have six weeks after the final oral exam to incorporate required or suggested changes made by the committee and polish the thesis before submitting the final document to the Graduate School. Requirements for this change; currently these are:
(1) one unsigned electronic copy to be deposited in the ScholarsArchive,
(2) one signed electronic copy to be submitted to the Graduate School, as well as one signed hard copy of an ETD Thesis Submission Form along with the title page of the thesis. Two hard copies of the thesis can be printed for free at Student Multimedia Services in the library. Nevertheless, always check the Graduate School web pages regarding thesis requirements before you finalize your documents (http://gradschool.oregonstate.edu/success/thesis-guide).

In addition, the Department requires that all graduate students provide a professionally bound copy of their dissertation or thesis for placement in the BB library. The cost for this BB library copy is the responsibility of the student.

5.4.2.The defense seminar

This is the public part of the final exam or “thesis defense”, and consists of a one-hour seminar on all or part of the work that is contained in the thesis. This public presentation with a question and answer session typical for a normal seminar is followed by a closed-door private final oral exam with the student's committee members that can take between one to two hours. Seminars are usually given in ALS 4001 to a large audience but the Final Exam is typically held in the BB conference room (ALS 2040).

Students *MUST* schedule the time and place of their final exam well in advance, as for the other two important committee meetings. This is one of three meetings that must be scheduled with the Graduate School and the Graduate Council Representative must be present. Students also need to schedule the public defense seminar with the

department office so that staff will be able to distribute e-mails and fliers so that the whole Department can attend. Students must obtain permission from their major professor to schedule this seminar, and again they must coordinate a block of time so that all members of the committee can attend the seminar and participate in the final examination. Copies (ideally hard copies and electronic files, e.g. MS Word format) of the thesis *MUST* be submitted to the members of the committee at least two weeks prior to the seminar and the subsequent exam. Again, this must be scheduled well in advance.

5.4.3. Final Exam

This is the private oral defense of a dissertation with only the members of the graduate committee. The committee must determine if the material that has been included in the thesis is sufficiently novel, relevant, descriptive of a substantial quantity of original research, and thus usually publishable. In this ultimate exam of graduate student careers students will be the experts, who will likely be asked what the next logical experiments may be, what could have been done different with the benefit of hindsight, and what the next steps in their science career will be.

As during the Preliminary Exam, the first portion of this exam is chaired by the major professor. The second, deliberation phase of the exam for which the student is asked to step outside, is chaired by the Graduate Council Representative, whose major function is to assure that the student and all members of the committee are treated fairly, and that Graduate School guidelines and quality requirements are met.

5.5. Life after OSU

5.5.1. Search for post-doctoral positions during the last year

It is the student's responsibility to arrange for the next stage of their career. The major professor will provide valuable advice with this task, and ideally has already encouraged students throughout their time in the department to network with a large base of colleagues. In addition, major professors often learn of post-doctoral positions by word of mouth or through professional society websites or e-mails. The Graduate Student Advisor will also be clued in to many post-doctoral opportunities, so contact Michael Freitag (freitagm@onid.orst.edu) with questions.

A much more active approach is when students subscribe to the appropriate e-mail bulletin boards where position announcements are posted (e.g. through the journal *Science* via the AAAS or other scientific societies). A third very effective approach is to find the appropriate post-doctoral fellowship agencies, contact professors directly and get them to agree to help write an independent fellowship proposal that will sponsor research in the professor's lab. This is the best-case scenario, as new post-doctoral fellows will then bring their own funding upon arrival at the new lab. Many professors will be agreeable to take a post-doc for one year with the understanding that such independent applications must be written. All this must be planned well ahead of the actual date of receiving a Ph.D., at least nine months in advance of the targeted date of

program completion, because the review cycles for all funding agencies run about six to nine months.

Potential sources for postdoctoral fellowships. Students should anticipate one to two months to prepare a decent proposal and six to nine months for review prior to potential funding. Start dates are usually flexible.

(Incomplete) list of agencies that support individual post-doc applications:

American Cancer Society
1599 Clifton Rd., NE
Atlanta, GA 30329-4251
Basic and cancer-related research
http://www.cancer.org/research/applyforaresearchgrant/granttypes/index

American Heart Association
http://my.americanheart.org/professional/Research/Research_UCM_316889_SubHomePage.jsp

American Lung Association
http://www.lung.org/finding-cures/our-research/awards-and-grants/

Damon Runyon Cancer Research Foundation
131 East 36th Street
New York, NY 10016
Basic and cancer-related research
http://www.damonrunyon.org/research_results/categories/category/award_programs/

Helen Hay Whitney Foundation
http://www.hhwf.org/HTMLSrc/ResearchFellowships.html
450 East 63rd St.
New York, NY 10021-7928
Basic biomedical research, in USA only

Jane Coffins Childs
http://www.jccfund.org/fellowship-information

Life Sciences Research Foundation
Lewis Thomas Laboratories
Washington Rd.
Princeton University
Princeton, NJ 08544
Research in biological sciences

Change in research direction
(2nd postdocs possible)
Leukemia and Lymphoma Society of America
http://www.lls.org/researchershealthcareprofessionals/academicgrants/

National Institutes of Health
Extramural: http://grants.nih.gov/training/nrsa.htm
Intramual (at NIH): https://www.training.nih.gov/programs/postdoc_irp
US citizen or permanent resident only.

National Science Foundation
http://www.nsf.gov/funding/
US citizen or permanent resident only.

5.5.2. Search for industry positions during the last year

If a student's career goals include an industry position, they should consult the GEN Guide to Biotechnology Companies (see Kevin Ahern) for an idea what companies are around. There are several approaches to getting a position at a particular company. Perhaps the best way is to determine whether any of the faculty members have contacts at any of the companies that students are interested in. Another is to send resumes out to employment agencies in the field of "biotechnology". These agencies are in the business of finding potential employees with specific expertise to fill a position. Another way is to use the personnel placement sections of journals such as *Science* and *Chemical and Engineering News*. Finally, many companies operate their own postdoctoral training programs (e.g. Genentech). Students should contact a specific company to inquire about this possibility, but again it is most helpful to find a specific contact. Many companies have policies that prohibit the use of postdoctoral positions to fill permanent vacancies.

5.6. Other general questions and responsibilities

5.6.1. Balancing coursework and research

Success in graduate school is not achieved by focusing on any single area. It is very important to succeed in all of the main areas of responsibility. Thus, a student must allow enough time for studying to be able to earn A or B grades in courses (to remain in good standing with a 3.0 GPA, and no more than one B- in the core classes), while also meeting teaching and research assistantship responsibilities.

5.6.2. Transition from classroom to research

The relative importance of coursework drops off rapidly once the required course load listed in the graduate program has been completed. The student will be evaluated no longer by the performance on quizzes or exams but by performance on individual research projects, where standards of evaluation are often not spelled out clearly, but the final tangible product is a peer-reviewed publication in a widely read scientific

journal. As the student becomes more engaged in research, taking additional courses should may not advantage ones research career. Nevertheless, students should take advanced courses that are relevant to the specialized research area and future interest, even though they may not be included in the formal, agreed upon program. One option is to take such classes as “P/N”, or to audit. These decisions should be made only after consulting with the major professor. If students wish to audit a class they also should seek permission from the instructor(s).

5.6.3. Transition from research credits to thesis credits

During first year lab rotations, students register for at least three, but most typically five, research credits (BB 501/601) in order to make each term total 12 credits. From the second year on, student should adjust their thesis credits (BB 503/603) each term during the regular school year so that they total 16credits per term. Students on stipends register for typically nine credits during the summer including thesis credits (BB 503/603)..

5.6.4. Discussion of Departmental Service Activities

Part of being a member of the department (and the scientific community) is giving back in terms of service, to enhance the quality of the department, OSU, and the community at large. Some service activities available to students include:

1) hosting of the annual BB departmental picnic at the beginning of each school year (typically organized by second year students);

2) hosting of graduate student-invited seminar speakers;

3) hosting and recruiting of visiting prospective graduate students;

4) organizing and running various journal clubs;

5) selecting and organizing the visit of the annual Tsoo King Lecturer.

5.7. Timelines

5.7.1. Timeline - Ph.D. students

The following timeline is meant to serve as a guide through a graduate career. Special circumstances result in departures from this guide. For details about exceptions refer to the Graduate School Survival Guide or ask the Graduate School. Also, first seek advice from your mentoring major professor and the Graduate Advisor.

First Year:
1. Teaching;
2. Lab rotations;
3. Complete bulk of coursework. Usually includes the Biochemistry (BB 590/591/592) and Biophysics (BB 581/582/583) series;
4. Participate in First Year Seminar (BB 507 [MS]/607 [PhD]) and Journal Club;
5. Select a major advisor (research lab);
6. Select committee members and hold program meeting by the end of the year or by the end of the fifth quarter at OSU (***meeting must be scheduled with Graduate School***).

Second Year:
1. Hold program committee meeting to plan last of coursework;
2. Help in running departmental picnic Fall Quarter;
3. Finish coursework (selected topics classes);
4. Complete significant research, prepare thesis proposal and Pass Preliminary Exam.

Third Year:
1. Schedule, prepare for, and take Oral Preliminary Exam ***by the end of the fall term (this is a hard deadline! Meeting must be scheduled with Graduate School****);*
2. Arrange for and give Third Year Seminar;

Fourth and/or Fifth Year:
1. Search for post-doctoral position;
2. Finish research and write thesis;
3. File thesis title approval form with the Graduate School **the term prior to the term you intend to defend**;
4. File diploma application with the Graduate School **prior to the term you intend to graduate**;
5. File "Approval to Schedule Final Oral Examination" two weeks
prior to the final oral examination;
6. Submit copies of thesis to committee members and graduate school at time you schedule final oral exam (two weeks in advance of the final exam date);
7. Schedule room and time with departmental office for exam;
7. Take (and pass) Final Oral Exam;
8. Submit final unbound copies of thesis to Graduate School for approval;
9. Submit one bound copy of thesis to major professor and one bound copy of thesis to departmental library. **5.7.2. Timeline - M.S. students**

General Requirements

All master's degree programs require a minimum of 45 graduate credits including thesis (6 to 12 credits) or research-in-lieu-of-thesis (3 to 6 credits). Exceptions to this capstone requirement are specified under the degree descriptions that follow these universal master's degree requirements. Effective fall 2005, all graduate student programs of study submitted to the Graduate School must consist of, at a minimum, 50 percent graduate stand-alone courses. The remaining credits may be the 500 component of 400/500 slash courses. General regulations for all master's programs are cited here, with certain exceptions provided for master's degrees in the professional areas listed on the following pages.

All master's students must:

a. Conduct research or produce some other form of creative work, and
b. Demonstrate mastery of subject material, and
c. Be able to conduct scholarly or professional activities in an ethical manner

The assessment of these outcomes and the specification of learning objectives related to these outcomes are to be carried out at the program level.

5.7.2.1. M.S. with Thesis Option

First Year:

1. Teaching;
2. Lab rotations (usually two);
3. Take core and other courses;
4. Participate in First Year Seminar;
5. Select a major advisor (research lab);
6. Select committee and hold meeting before completing eighteen credits worth of coursework.

Second Year:

1. Help in running departmental picnic Fall Quarter;
2. Finish coursework (total of 45 credits of coursework);
3. Finish research and write thesis;
4. File thesis title approval form with the Graduate School the **term prior to the term you intend to defend**;
5. File diploma application with the Graduate School **prior to the term you intend to graduate**;
6. File "Approval to Schedule Final Oral Examination" one week prior to the final oral examination;
7. Submit copies of thesis to committee members and graduate school at time you schedule final oral exam (one week in advance of the final exam date);
8. Schedule room and time with departmental office for exam;
9. Take (and pass) Final Oral Exam;
10. Submit final unbound copies of thesis to Graduate School for approval;
11. Submit one bound copy of thesis to major professor and one bound copy of thesis to departmental library.

5.7.2.2. M.S. without Thesis Option

Same as C. but without formal thesis. A short research presentation and a research report are required, this can include literature research only. This meeting constitutes an oral final examination and defense of the independent work of research produced by the student. May be completed in three quarters if fifteen credits are earned per quarter.

5.8. Information about Corvallis and OSU

5.8.1. Corvallis

For detailed information (largely true) see Wikipedia at:
http://en.wikipedia.org/wiki/Corvallis,_Oregon

As noted by Sperling's *The Ten Best Places to Live (2010)*, "Corvallis is home to Oregon State University and hence many young singles. Technology stalwart Hewlett-Packard has a major presence here, which helps explain the city's low unemployment rate and impressive recent job growth. The presence of OSU and HP has created something of an intellectual center - over 20% of its residents have earned a graduate or professional degree. The fertile Willamette Valley was the destination of 19th-century settlers from the Midwest, and since then has retained a peaceful agrarian feel. Summers are sublime and the winters are mild, if a bit wet. For recreation, the rugged Oregon coast is [60] minutes to the west, the nearby Cascade range offers great skiing, and Portland is about 100 miles to the North. Considering it's affordability ($194,800 median home price), Corvallis presents an attractive mix of youth, intellectualism, and natural beauty."

Corvallis has the highest percentage of bicycle commuters of any US city (at ~10%; data from 2009). But buy a good lock for your bike. OSU has greater than $40,000 worth of bicycles stolen on campus per year.

Weather

Oregon weather in the Willamette Valley is relatively mild and moist. Average temperature in the winter is 45F, while in the summer the average temperature is 80F. Annual precipitation in Corvallis is approximately 42.7 inches; during winter more than half the days have measurable precipitation. The Oregon Climate Service offers forecasts and additional climate data.

Local News

The local paper is the Gazette Times . With this you can find out about local news, sports events, housing opportunities, and more.

Additional links for Corvallis and Oregon that might be helpful:

Corvallis Visitor information:
http://www.visitcorvallis.com/
General City information:
http://www.corvallis.com/
Exploring Oregon
http://oregonstate.edu/visitors/oregon/oregon.htm
Chamber of Commerce Business Directory
http://www.corvallischamber.com/
Oregon Outdoor Recreation Opportunities:
http://www.gorp.com/gorp/location/or/or.htm

Biochemistry and Biophysics
Student Rotation Form

Student _____

Fall term

Proposed Mentor_____ Topic_____

Winter term

Proposed Mentor_____ Topic_____

Spring term

Proposed Mentor_____ Topic_____

The signatures below indicate that rotations and topics have been discussed by the student and proposed mentors.

_____ Date_____
Graduate Student Advisor

_____ Date_____
Student

Biochemistry and Biophysics
Student Rotation Evaluation Form

Student: **Mentor:** **Term:**

Please evaluate the student's performance in the listed categories. Use grades of 1 (poor) to 5 (excellent) and include explanatory comments.

	Score	*Comments*
Effort		
Laboratory skills		
Acquired knowledge		
Communication		
Creativity		
Maturity		
Ability to work with others		

Other comments:

Would you consider having this student join your laboratory this year? Yes No

This evaluation has been discussed by the student and mentor:

Mentor Signature: _____ Date: _____

Student Signature: _____ Date: _____

Please return the completed form to the BB Office. Thanks! **Sep. 2014 version**

Biochemistry and Biophysics
Student Teaching Evaluation Form

Teaching Assistant: **Faculty Instructor:** **Term:**

Please evaluate the student's performance in the listed categories. Use grades of 1 (poor) to 5 (excellent) and include explanatory comments.

	Score	*Comments*
Effort (fulfilling requirements as outlined by instructor)		
Accuracy (in grading, in information to students)		
Communication (with students and with instructor, as relevant)		
Organization (record keeping, punctuality)		

Would you consider having this student TA for you again? Yes No

The signatures below indicate that this evaluation has been discussed by the student and mentor.

Mentor Signature: _____ Date: _____

Student Signature: _____ Date: _____

Please return the completed form to the BB Office. Thanks!