



A Guide to Pharmacy Graduate Programs

2007-2008

Welcome to the OSU College of Pharmacy.

Oregon State University, a member of the Oregon University System, is a comprehensive public research university. It is the state's land-grant, sea-grant and space-grant institution. The College of Pharmacy at Oregon State University places high priority on graduate education and the improvement of human health by advancing the discovery and understanding of medicines. We strive to prepare the graduate pharmacy students of today to be the pharmaceutical sciences researchers of tomorrow. We're pleased that you've chosen to join our graduate programs.

Upon graduation, we expect that pharmacy graduate students will be competent to:

- Expand the knowledge of their discipline(s), having developed:
 - Research and scholarship skills.
 - Effective oral and written communication skills.
 - An extensive understanding of the knowledge base of the discipline.
 - A broad, general understanding of pharmaceutical and health biosciences.
- Enter the profession of pharmaceutical science, having developed:
 - A network of professional peers and role models.
 - An understanding of the requirements of the workplace, whether academic, industrial, or other.
 - A sense of the culture of pharmaceutical science.
 - A deep appreciation for the ethical conduct of research.
- Teach and mentor future pharmaceutical scientists, having experienced:
 - A compelling learning environment.
 - Opportunities to serve as a teacher and mentor.

This guidebook meant to help you navigate our programs. Students are encouraged to consult the College of Pharmacy website (<http://pharmacy.oregonstate.edu>), selecting the link "Graduate Studies" for added details.

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1. Getting started:

1. Meet with Debra Peters in room 115 Pharmacy and find your major advisor.
2. Obtain a university ID card from the ID Center in the Memorial Union.
3. Register for a university email ONID account (mandatory) at the website “<http://onid.orst.edu>” and choose “sign up for ONID.”
4. Register for the gspharm listserv (mandatory) at the website “<http://lists.oregonstate.edu>”.
5. Sign up for health insurance.
6. Meet Janet Schmidt in room 115 Pharmacy to set-up payroll if funded.
7. Collect copies of the faculty and staff, and graduate student photo directories for the College.
8. Outline a program of study for your first term in consultation with your major advisor and register for classes.
9. Discuss expectations for research work with your major advisor and/or your research rotation supervisor, find the lab, and get started.
10. Obtain keys by filling out paperwork with Terri Allen in room 203 Pharmacy to be co-signed by your advisor.
11. Take advantage of university orientation programs to familiarize yourself with the Valley Library, electronic resources, and university programs for graduate students.
12. Familiarize yourself with lab safety equipment and procedures (*e.g.* shower, eyewash, fire extinguisher, first aid kit, fire blanket, fire escape routes, radiation areas).
13. Discuss with your major advisor the potential need for radiation safety training, animal care and use training, dive certification, NMR check-out, English language training, or other specific concerns.

2. Coursework and academic requirements:

Curriculum

All pharmacy graduate students are required to take Phar 735, Foundations of Drug Action (4 credits, fall term), preferably in their first year. Otherwise, the coursework to be completed in the first two to two-and-a-half years of the program varies based on discipline and subdiscipline. Students will individually craft programs of study based on consultation with their major advisor. General guidelines for programs of study in medicinal chemistry, pharmacology, and pharmaceuticals follow in appendices.

Credit Requirements

OSU currently requires that pharmacy graduate students complete 36 credit hours of didactic course work for a Ph.D. degree and 24 credit hours for a Masters degree (thesis or non-thesis). Didactic courses exclude thesis, seminar, and reading and conference classes (generally, those are courses without a "0" in the middle number, *e.g.*, Phar 503). The remaining credits (108 for Ph.D. or 45 for a Masters) are completed with thesis, conference and seminar.

Students paid as a GRA or a GTA with a tuition waiver should sign up for the maximum number of credits each academic term (16 units) and 3 credits in summer term. Fill in 1 unit of Phar 507 (Seminar) each term and a variable number of units of 501 (rotation research), 603, or 503 (PhD or Masters Thesis Research).

GPA requirement

Pharmacy graduate students are required to maintain a 3.0 GPA in all didactic coursework to remain in good academic standing. This requirement is more rigorous than the university's requirement of a 3.0 GPA overall. The College of Pharmacy graduate studies committee is responsible for decisions regarding the progress of students not meeting the department GPA requirement, which may include loss of funding. The OSU Graduate School automatically handles students not meeting the university GPA requirement.

Preliminary exam for PhD students

Effective Fall 2006, all pharmacy PhD students are expected to complete their preliminary exams within nine

Non-thesis Masters

OSU allows a non-thesis option for Masters degree seeking students. In pharmacy, Masters students are expected to complete a minimum of 9 credits of research, including research rotations. A non-thesis Masters committee consists of three graduate faculty members including the major advisor. A graduate school representative is not required for a non-thesis Masters. A meeting of the committee should be scheduled in the students first academic year for approval of the program of study. Upon completion of coursework and research, non-thesis Masters students must convene an oral examination with the committee. The examination should consist of a 20 to 30 minute student presentation of research followed by questioning on the presentation and then more general topics based on the student's graduate curriculum. Options for pass or fail are identical to those for the thesis Masters or PhD preliminary exams.

3. Life as a pharmacy graduate student:

Funding:

Graduate assistantships are normally granted only to PhD seeking students. Graduate students admitted without funding should not expect that funding will become available at some point in their graduate program.

A limited number of teaching assistantships are available each year to outstanding students to assist with undergraduate or professional courses. Along with a stipend, these assistantships provide a complete tuition waiver for the academic year. Funding for graduate research assistants is generally available to graduate students in or beyond their second year who are devoting the majority of their time to research. The research performed by these assistants is usually applicable to the doctoral dissertation. These research assistantships are funded by grants to individual faculty members from outside agencies so availability is variable.

Students are encouraged to work with their major advisers to apply for scholarships, grants, and fellowships from a variety of health research organizations. A list is available on the College of Pharmacy website (pharmacy.oregonstate.edu/a_level/academic_programs/grad_studies_support.html). Additionally, students should consider applying for the limited number of highly competitive university scholarships available each year.

Teaching:

The graduate programs in Pharmacy (M.S. and Ph.D.) do not have a formal teaching requirement. However, opportunities for gaining experience in the classroom are available for those wishing to teach Phar 210, Terminology for Health Professionals. The College of Health and Human Performance has put together an excellent handbook on teaching skills. Please see Dr. Filtz if you would like a copy.

Literature reading recommendations:

Every week spend one to two hours in the library reading broadly in science, looking at Science, Nature and specialty journals.

Every week perform a directed PubMed or SciFinder search, or join an automated literature retrieval service.

Develop an electronic database of references, keep it updated, and keep a file drawer of manuscripts of greatest interest and importance.

Always carry photocopies of papers of interest for reading later while waiting in line, eating lunch, in the doctor's waiting room, trying to go to sleep, etc.

Seminar:

Pharmaceutical sciences seminars are generally held Tuesdays from 11 AM to noon in Rm 305 Pharmacy and are announced through the gspharm listserv or by flyer.

Pharmaceutical sciences seminars are mandatory for graduate students. Seminar topics outside of the student's discipline provide breadth to a program of graduate study that complements the depth necessary for successful thesis work.

Attend three to four seminars around campus per month (Chemistry, Toxicology, Biochemistry, Botany, Zoology, CGRB, Microbiology, Vet Med, etc.).

Take notes and keep a seminar book of ideas

Annual spring retreat of the College of Pharmacy:

Details about the schedule and location of the annual College of Pharmacy research retreat are generally available during winter term every year.

Students are expected to present an oral or poster presentation at each year's retreat.

Students are expected to give an oral presentation AT LEAST every other year, preferably every year. In lieu of an oral presentation, students may present a poster.

Sometime before the spring retreat, first year students should find the Media Services Center (room 109 Kidder Hall) and register for the course in poster construction; also see: www4.ncsu.edu:8030/~grhess/posters/ for some very nice hints on effective poster presentations.

Conferences:

Discuss conference attendance with your advisor. Local, regional and/or national meetings provide opportunities for students in all pharmacy disciplines to practice public speaking and engage in scientific discourse with fellow researchers in a variety of settings.

Attending a conference is work! Prepare before the conference by becoming rigorously up to date with the literature. Meet as many people in your field as possible by talking with them at poster sessions, asking insightful questions at scientific sessions, and by joining in the social activities.

Keep a conference notebook with ideas, contacts, potential postdoctoral opportunities, and follow-up tasks.

Professionalism:

Join a scientific society as a student member. Most societies (*e.g.*, Society of Toxicology, Society for Neuroscience, American Society for Pharmacology and Experimental Therapeutics, American Society for Pharmacognosy) have reduced rates for students, allow members to apply for travel awards to conferences, provide job search opportunities, and other benefits. Societies are one means to be involved as a steward of your discipline.

Find a journal club on campus whose research interests are closely aligned with yours.

The Molecular and Cellular Biology program runs a journal club every Friday. A journal club for those interested in receptor pharmacology meets twice monthly.

Other options may be identified by your major advisor.

Get involved in shaping the department and the future of your discipline. The graduate studies committee has a student member. Graduate students are always asked to meet prospective faculty at interview lunches and to provide feedback to faculty search committees.

Ethics:

The ethics involved in scientific research are too numerous to delineate here but include a responsibility to be a wise steward of the public's money by avoiding unnecessary spending, working diligently, and reporting all work honestly. Additionally, graduate students have a responsibility to keep accurate and detailed lab notebooks for future reference and to acknowledge everyone who provides intellectual, physical, and monetary support.

Plagiarism, fabrication or falsification of research data are serious ethical breaches which will result in dismissal from the university.

Students should never perform a procedure or use equipment for which they have not received training or have uncertainties about their skills.

Everyone should be responsible for cleaning their own messes.

University laboratories are often excitingly diverse environments with scientists of many nationalities working together; mutual respect is absolutely expected.

Accidents and grievances:

For any injury more than a simple scratch, an accident report should be filled out with Vickie Staffebach (room 203 Pharmacy). Students are strongly urged to bring issues of grievance to their major advisor, Department Chair (Gary Delander), the Graduate Studies Committee (Theresa Filtz, Chair), or the Dean (Wayne Kradjan) for resolution prior to utilizing university channels. University-level grievance procedures are detailed on the graduate school website (oregonstate.edu/dept/grad_school/current/grievance.html).

4. Program Committee Meeting:

A thesis committee meeting **MUST** be held by a student's 5th quarter of study.

Committee Structure (five members total) – The thesis committee is chaired by the student's primary advisor. Additional committee members are recommended to include one to two from the College of Pharmacy, one to two from another department, and one graduate school representative. (The graduate school representative is chosen from a list obtained from the graduate school.)

To prepare for a first committee meeting:

- 1) Establish that all potential committee members are willing to serve and schedule a mutually-acceptable meeting time.
- 2) Receive approval from the graduate school for selection of the graduate school representative.
- 3) Inform the university graduate school of meeting time and location.

To the first committee meeting bring:

- 1) A completed program of graduate study on the official form with grades entered.
(one copy for each committee member)
- 2) Program on form without grades.
(one copy for signing)
- 3) Current *C.V.*
(one copy for each committee member)
- 4) One to three page summary of research to date (emphasize graphic information) and a short description of future work planned.
(one copy for each committee member)
- 5) A twenty minute presentation on your research to date and plans for the future using overheads or PowerPoint.

5. Preliminary Exam:

The preliminary exam is taken near or immediately after the completion of all didactic coursework, ideally early in the student's third year of study. Beginning in Fall 2006, all PhD degree-seeking students in pharmacy are required to complete preliminary examinations within nine academic (non-summer) terms of the start of their graduate studies.

An extension may be requested from students or faculty members who anticipate that a preliminary exam will not be completed within nine academic terms. The request is made to the graduate studies committee by detailing circumstances causing delay and providing a plan for completion. Students transferring from a Masters to a PhD degree within the pharmacy graduate program will be considered individually at the time of transfer, taking into consideration the amount of coursework completed at time of transfer. Transfer students should discuss a timeline for completion of preliminary exams at their first committee meeting in pharmacy.

Students will no longer be considered in good academic standing who have not completed preliminary exams by the beginning of their tenth academic term, and will be reviewed by the graduate studies committee. As a reminder, good academic standing is required for GRA or GTA support.

Schedule three hours for the exam by conferring with all committee members, reserving a room, and notifying the graduate school at least two weeks in advance. Paperwork will be sent to the graduate school representative prior to the exam for completion at the exam.

To pass preliminary exams, Oregon State University allows for one dissenting committee vote. Students who fail a preliminary exam may, at the discretion of the student's committee, retake the exam after a minimum period of 30 days. The College of Pharmacy allows only one retake of the preliminary exam.

Nature of the Exam: two parts, written and oral, for all students:

a) Written

The written part of the exam varies by discipline. Both medicinal chemistry and pharmacology require written grant proposals as described below. Medicinal chemistry also requires a written description of the thesis topic at the time of the preliminary exam. Pharmaceutics requires written completion of questions submitted by each of the five thesis committee members.

b) Oral

All disciplines require completion of the oral exam. To begin, prepare a brief (15-20 minute) presentation of your grant proposal, if applicable. Initial questions will be based on the written exam. Questions will then expand to include any topics relevant to the discipline, the student's program of study, and finally, your thesis topic. Students are encouraged to form a "mock" committee of other, often senior, students to practice fielding questions.

Written exam grant proposal for medicinal chemistry and pharmacology students:

A creative proposal of your own ideas is written in the form of an NIH postdoctoral fellowship application. The proposal should be limited to 20 double-spaced (10 single spaced, 12 point font) pages maximum for the narrative, excluding references. The proposal format and structure are described below

Selection of a good topic is one of the hardest elements of this exercise. Students are encouraged to keep a file of “possible prelim topic ideas” from the beginning of their graduate studies.

Faculty should not provide substantial input in the preparation of the proposal. However, students are encouraged to consult major advisors and committee members regarding proposal topic ideas. The best plan would be to submit several ideas to your thesis committee in the form of abstracts and ask for approval. Faculty may also be willing to “proofread” student proposals for basic grammatical errors and provide input into correct grant structure. Students may utilize other students for help in understanding unfamiliar techniques and are encouraged to schedule “mock prelims” for practice with senior graduate students.

Preliminary exam grant and thesis proposals **MUST** be distributed to all committee members at least one week prior to the scheduled oral examination.

Characteristics of a good preliminary exam proposal:

- Builds on your area of expertise but is not a direct extension or close parallel of your thesis research.
- Is on a topic peripheral to your area of expertise, allowing you an opportunity to read in depth about a new subject of interest.
- Is not a topic so far removed from your area of expertise that you don’t have command of the subject area.
- Is hypothesis driven.
- Is based on a subject about which enough is already known that specific and focused hypotheses and experiments are readily developed.
- Does not have a fatal flaw at the outset, *e.g.*, – successful completion of a first aim is necessary for all subsequent aims. This common problem can usually be remedied by providing alternative hypotheses.
- Includes sufficient background information to permit an effective review without reviewers having to refer to the literature.
- Is written with clarity, correct grammar and spelling, and concision.

Structure of the grant proposal:

1.*Specific Aims*. State the specific purpose of the research proposal and the hypotheses to be tested (1 page).

2.*Background and Significance* (3-5 pages). Describe the background to the proposal that is specifically relevant to the specific aims. State concisely the importance of the research described in this application. Relate previous work by others to your specific aims and broad research objective. Briefly describe the significance of the proposed studies in the larger context of science or health research.

3.*Research Design and Methods* (14-16 pages). Provide a rationale and research design including the procedures to be used to accomplish the specific aims (Methods). Methods should be sufficiently detailed to convey to reviewers an understanding of the procedure without being overburdened by detail on commonly used protocols. Include a discussion of how the data will be analyzed and the meaning of different potential outcomes. Note any procedures, situations, or materials that may be hazardous to personnel and list the

precautions to be exercised. Potential experimental difficulties should be discussed together with alternative approaches that could achieve the desired aims.

More information on writing an NIH-style grant proposal is available through the NIAID website at <http://www.niaid.nih.gov/ncn/grants/write/index.htm>. This site includes helpful information on planning, formatting and writing NIH grants. Examples of successful NIH postdoctoral applications may be obtained from the Grad Studies Chair or your major advisor.

Thesis proposal for medicinal chemistry students:

This should be a roughly five to six page narrative, rich with graphics, which summarizes your research findings to date, and gives your rough plans for the remainder of your graduate studies.

Include this document with the preliminary exam grant proposal.

6. Final Defense:

- a) Writing the thesis- plan 4-6 months start to finish, writing and researching approximately half time during this period.
- b) Obtain instructions for format and details of the written thesis from the university graduate school (oregonstate.edu/dept/grad_school/thesis/thesisguide.pdf). OSU allows two different formats for a graduate thesis, standard or manuscript. The student and major advisor should determine which format is appropriate.
- c) Plan a date for the defense at least two months in advance with your committee; reserve a room for a one-hour seminar and a two-hour final exam.
- d) Immediately after setting your defense date, contact Debra Peters (room 135 Pharmacy) to advertise the seminar date. University regulations require that every thesis defense be advertised and open to the scholarly community.
- e) Provide chapters to your major advisor for review as they are completed; proofread and spell-check beforehand.
- f) Distribute the thesis, with the approval of your major advisor, 2 weeks before the final defense date.
- g) Defend your thesis starting with an hour-long seminar for the scientific community. Up to two hours should be scheduled for the thesis defense exam with the committee. Students should be able to describe the specific methodologies used, identify critical observations, defend conclusions made based on these observations, and place their studies in the broader context of bioscience research. Students may pass the examination with up to one dissenting vote. If a student fails to satisfactorily defend the thesis, only one additional attempt is permitted and must follow a written appeal to the College of Pharmacy Graduate Studies Committee. The thesis defense must be completed within five years after the preliminary exam.
- h) Make final copies of your thesis after completing any revisions recommended by the committee and obtaining required signatures.
 - o One hardbound and one electronic (pdf) file copies for the university library (paper and binding requirements are described in OSU thesis instructions noted in part b above).
 - o One soft bound copy for your major advisor.
 - o One hard bound copy for the pharmacy library.
 - o One hard bound copy for your mother.
- i) Celebrate your hard-earned achievement and find a real job.