



A Guide to Pharmacy Graduate Programs

2017-2018

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Note: The forms in sections 7-14 are available online at <http://pharmacy.oregonstate.edu/phd-student-resources>

Getting started:

Welcome to the Oregon State College of Pharmacy. Oregon State is a leading public research university that is the state's Land Grant university and is one of only two universities in the U.S. to have Sea Grant, Space Grant and Sun Grant designations. The College of Pharmacy at Oregon State places high priority on graduate education and the improvement of human health by advancing the discovery and understanding of medicines. We strive to prepare our graduate 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 pharmaceutical sciences graduate students will be competent to:

- Expand the knowledge of their discipline(s), having developed:
 - Research and scholarship skills.
 - An extensive understanding of the knowledge base of the discipline.
 - A broad, general understanding of pharmaceutical and health biosciences.
- Communicate research findings having developed the skills to:
 - Give oral presentations in scientific and public forums
 - Produce scientific writing for manuscripts for peer-reviewed journals
- Enter the profession of pharmaceutical science, having developed:
 - A network of professional peers and role models.
 - An understanding of the requirements of academic, industrial, or other workplaces.
 - 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.

Day 1

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 (room 103).
3. Register for a university email ONID account (mandatory) at the website "<http://onid.oregonstate.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 at "<http://studenthealth.oregonstate.edu/graduate-assistant>".
6. If receiving a GRA or GTA, get help with setting up payroll.
7. Outline a program of study for your first term with your major advisor and register for classes.
8. Discuss expectations for research work with your major advisor and/or your research rotation supervisor, find the lab, and get started.
9. Obtain keys by having your advisor make the appropriate request to the Dean's office.
10. Take advantage of university orientation programs to become familiar with the Valley Library, electronic resources, and university programs for graduate students.
11. Discuss with your major advisor the potential need for laboratory safety training, radiation safety training, animal care and use training, dive certification, NMR check-out, English language training, or other specific concerns.
12. Familiarize yourself with safety equipment and procedures specific to your chosen lab, (e.g. eyewash/shower, fire extinguisher, first aid kit, fire blanket, fire escape routes, radiation areas).

Coursework and academic requirements:

The Graduate School at Oregon State University sets minimum requirements for graduate degrees. In certain instances, the College of Pharmacy stipulates more stringent requirements for its students than the minimums established by the Graduate School. Students should pay particular attention that the College of Pharmacy differs from the Graduate School in requiring that the oral prelim exam be completed within **9 academic terms** of commencing a PhD degree program, that the remote participation policy is more stringent in regard to student participation, and that a 3.0 GPA must be maintained in all didactic coursework to remain in good standing.

Curriculum

All pharmaceutical sciences graduate students are required to take PHAR 735, Foundations of Drug Action I (3 credits, fall term) and PHAR 669, Introduction to Grant Proposal Writing (1 credit, proposed as 2 credits). Graduate students in the pharmacology discipline are also required to take PHAR 527 Foundations of Drug Action II (3 credits, winter term). Training in responsible conduct of research is also required, and may be satisfied by enrollment in MCB 557 or GRAD 520. Otherwise, the coursework to be completed in the first two to two-and-a-half years of the program varies based on disciplinary tracks. Guidelines for programs of study in medicinal chemistry, pharmacology, and pharmaceuticals are listed on the website under “Courses” for each discipline, but students should consult their major advisor for specifics. A program of study will be developed with the online tool “MyDegrees”.

Credit Requirements

OSU requires a total of 108 credits for a Ph.D. degree, or 45 credits for a Masters degree. Graduate students must complete 27 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 (“blanket credits”, meaning courses with a “0” in the middle number, e.g., Phar 507). With the exception of Phar 503 and Phar 603 (thesis research), students may only include a maximum of 15 blanket credits on their program of study. Despite this OSU rule, pharmaceutical sciences graduate students should register for 1 credit of Phar 507 (Seminar) each term.

Students paid as a GRA or a GTA with a tuition waiver must sign up for the maximum number of credits each academic term (16) and 3 credits in summer term using a variable number of units of Phar 603 or Phar 503 (PhD or Masters Thesis Research) to fill out their schedule as needed.

Rotation Requirements

New students who have GTA funding are required to complete three research rotations in their first year. Rotations are generally completed within the student’s discipline, but a student is allowed to choose a lab outside their own discipline to gain a breadth of experience if desired.

Rotating students must register for a minimum of 3 credits of Phar 601 each term for their rotations.

GPA requirement

Pharmaceutical sciences 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 pharmaceutical sciences program GPA requirement, which may include loss of funding. The

OSU Graduate School automatically handles students not meeting the university GPA requirement. “C” grades are acceptable as long as the student average does not fall below 3.0.

Preliminary exam for PhD students

All pharmaceutical sciences PhD students are required to complete their preliminary exams within **nine terms** of enrollment (excluding summer). Students who do not complete their preliminary exams in a timely manner may be subject to academic probation and/or a loss of GRA or GTA funding. Students who are in danger of not completing their preliminary exam by the end of the ninth term **MUST** submit a letter explaining the circumstances to the graduate studies committee at least 6 weeks before the end of the ninth term. Thus, students should begin to plan their preliminary exam dates at the beginning of their third year, and not wait until close to the deadline.

Policy on distance participation in exams and committee meetings

OSU will allow any member of a thesis committee, including the student, to participate remotely via videoconference in committee meetings. However, the College of Pharmacy requires that the student **MUST** be on an OSU campus for their preliminary oral and thesis defense exams. For a program meeting or a preliminary exam, the College of Pharmacy also requires that a faculty member is physically present at the same remote site as the student participating remotely. The remote participation form must be completed and submitted to the Graduate School prior to any meeting in which a member will be at a remote location (forms can be found at http://oregonstate.edu/dept/grad_school/forms.php).

Waiver of course requirements

Students who, in consultation with their major advisor, desire to waive any of the above pharmacy program requirements need to submit a letter to the graduate studies committee (email Debra Peters). The letter should explain the reason for the waiver request and be co-signed by the major advisor. If approved, the committee will issue a letter to be included with the student’s Program of Study and kept on file.

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. 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 student’s 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 exams.

Pharmacy professional courses approved for use on a graduate program of study

The graduate council of OSU approved the use of the following professional pharmacy student courses as eligible for use on a graduate student program of study. No other professional pharmacy courses have been approved thus far.

PHAR 734	Pharmaceutics II (3 credits)
PHAR 735	Foundations of Drug Action I (3 credits)
PHAR 737	Foundations of Drug Action II (3 credits)
PHAR 746	Pharmacy Management (3 credits)
PHAR 750	Pharmacokinetics/Biopharmaceutics (4 credits)
PHAR 751	Biopharmaceutics (3 credits)
PHAR 752	Integrated Drug Structure, Action and Therapeutics I (7 credits)
PHAR 753	Integrated Drug Structure, Action and Therapeutics II (7 credits)
PHAR 754	Integrated Drug Structure, Action and Therapeutics III (6 credits)
PHAR 770	Advanced Pharmacokinetics (4 credits)
PHAR 773	EBM III: Evidence Synthesis and Decision Analysis (3 credits)
PHAR 776	PHARMA-CSI (advanced kinetics elective, 2 credits)

Continuous enrollment policy

OSU has a continuous enrollment policy for graduate students. Students must be enrolled for a minimum of 3 credits each academic term every year, or request a leave of absence, to remain in good standing. Please discuss the continuous enrollment policy with your thesis advisor or the Graduate Studies Director if you will be taking any time off from your studies for any reason, including leaving for an internship during the academic year. Please see the graduate school catalog for more detail if needed. Requests for leave of absence must be filed AT LEAST two weeks before the beginning of the term.

Thesis committee meetings

For PhD students, the first committee meeting must be held within four terms of matriculation by OSU policy and within two terms for MS students and PhD students going directly into a chosen research lab (on GRA). The next committee meeting is generally the preliminary exam meeting held within nine terms of matriculation by College of Pharmacy policy (excepting dual degree students). After successful completion of the preliminary exam, a student is required to have annual thesis committee meetings until graduation. More detailed information about committees and meetings is provided in section 5.

Annual assessment of progress

Starting in their second year, students and advisors are required to complete an annual assessment of progress and hold an annual committee meeting. The form and instructions are provided in section 7 below. The annual assessment may be discussed with the thesis committee if needed.

Life as a pharmacy graduate student:

Funding:

Graduate assistantships are normally granted only to PhD-seeking students in pharmaceutical sciences. 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 (GTAs) 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 (GRAs) 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. Additionally, outstanding students should consider applying for the limited number of highly competitive university scholarships available each year.

Teaching:

Pharmacy graduate programs 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 Sciences has put together an excellent handbook on teaching skills. Please see the Director of Graduate Programs (Kerry McPhail and Arup Indra, Co-directors) if you have teaching interests.

Annual retreat and orientation event of the College of Pharmacy:

Students (except first years) are expected to present an oral or poster presentation at each year's graduate student/faculty research retreat which is planned for Fall term from 2018 onwards.

In the Spring/Summer term before the retreat, first year students (going into second year) should find the Student Multimedia Services (<http://oregonstate.edu/is/mediaservices/sms/>) and register for the course in poster construction; also see: <http://www.ncsu.edu/project/posters> for some very nice hints on effective poster presentations.

Literature reading good practices:

Every week spend one to two hours 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 (e.g. Zotero®, Mendeley®, Endnote®, Papers®, or other reference software), keep it updated, and keep a file drawer of manuscripts of greatest interest and importance. The OSU library has regular tutorials on the use of reference manager software to help keep all of these papers organized.

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.

Seminars:

Pharmaceutical sciences seminars are announced through the gspharm listserv, and 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.

Conferences:

Every PhD student is required to attend at least one regional or national meeting and give a presentation (poster or oral) prior to graduation. Therefore, 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. The College of Pharmacy has some funds to allow senior graduate students to attend a national meeting. Students in their 3rd – 5th year are encouraged to apply for the travel funds. The Graduate School provides graduate student travel awards to cover up to half of the full cost of attending a conference (see <http://gradschool.oregonstate.edu/awards/travel-award>). Therefore, work with your advisor and the college to secure funds for you to travel to a meeting.

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.

Publications:

All graduating Ph.D. students are required to have either published or submitted a manuscript for publication in the peer-reviewed literature prior to graduation. Work with your advisor to prepare and submit your scholarly work to peer-reviewed journals in your field.

Professionalism:

Join a scientific society as a student member. The College of Pharmacy has a chapter of the American Association of Pharmaceutical Sciences (AAPS) that all students, MS, PhD and PharmD, are encouraged to join. AAPS provides funds for a seminar speaker every year chosen by the student members.

Most regional and national societies (*e.g.*, Society of Toxicology (SoT), Society for Neuroscience, American Society for Pharmacology and Experimental Therapeutics (ASPET), American Society for Pharmacognosy (ASP), etc) 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 in the future of your profession.

Find a journal club on campus whose research interests are closely aligned with yours. Pharmaceutics has a required journal club. Medicinal chemistry and pharmacology also run journal clubs, as does the Molecular and Cellular Biology program, and there is an epigenetics journal club run by Dr. Michael Freitag. Discuss other options with 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. OSU has a graduate student senate focused on issues of common concern.

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 up their own messes.

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

Safety:

Laboratory safety should be discussed with your rotation advisors and your major advisor before you start work in any laboratory and before you start any new protocol. At a minimum, students in all of our research labs in pharmacy should be wearing a lab coat, closed-toe shoes, leg coverings, gloves and safety glasses when working at the bench. More detailed requirements and information for specific kinds of lab tasks (e.g. chemical safety, biosafety) are available on the OSU environmental health and safety website at <http://oregonstate.edu/ehs> in the sections on "safety documents" and "manuals and plans". Always ask if you are not sure about a procedure, operating equipment or entering a new area.

Dr. Phil Proteau is our chemical hygiene and safety officer for the College of Pharmacy.

If working late or odd hours, check to see who is in the building and let them know that you are present. Many labs have a neighbor with a common door. Get to know your neighbors and check in on them.

Never let anyone into the locked building after hours or on weekends and make sure that the external doors are closed behind you when you leave. In the past, equipment has been stolen from unlocked labs and unauthorized individuals have occupied the building. Laboratory doors should be locked during the day if no one is working in them.

Accidents and grievances:

For any injury more than a simple scratch, an accident report should be filled out in consultation with your major advisor.

Students are advised to bring issues of grievance to their major advisor, the Academic Advisor (Angela Austin Haney), the Graduate Studies Committee (Kerry McPhail and Arup Indra, Co-directors), the Department Chair (Theresa Filtz), the Associate Dean for Academic Affairs (Gary DeLander), or the Dean (Mark Zabriskie), preferably in that order as possible, for resolution prior to utilizing university channels. University-level grievance procedures are detailed on the graduate school website (<http://gradschool.oregonstate.edu/progress/grievance-procedures>).

Committee Meetings, Exams and Thesis

Program Committee Meeting:

A thesis committee meeting **MUST** be held by a student's 5th quarter of study by university rules. The College of Pharmacy expects the thesis committee meeting to be held by the 4th quarter of study.

Committee Structure (five members total): The thesis committee is chaired by the student's primary advisor. Additional committee members need to include at least one other from the College of Pharmacy. OSU will assign a graduate school representative on the committee; students should obtain a list of potential representatives 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) Any waivers of programmatic requirements
- 4) Current C.V.
(one copy for each committee member)
- 5) 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)
- 6) A twenty-minute presentation on your research to date and plans for the future using overheads or PowerPoint.

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. 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 by 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. Transfer students should discuss a timeline for completion of preliminary exams at their first committee meeting.

Students who have not completed preliminary exams by the beginning of their tenth academic term will no longer be considered in good academic standing, and will be reviewed by the

graduate studies committee. As a reminder, good academic standing is required for GRA or GTA support.

At least **6 weeks** before your Preliminary Oral Exam submit your signed [program of study](#) to the Graduate School.

At least **2 weeks** before your Preliminary Oral Exam schedule your Oral Preliminary Exam by submitting the [online Exam Scheduling Form](#) (after your program of study has been approved by the Graduate School).

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 and before a maximum period to be determined by the student's exam committee but not to exceed 12 months. 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 consists of a student's thesis proposal. The thesis proposal **MUST** be distributed to all committee members at least two weeks prior to the scheduled oral examination. Within one week, the thesis committee will review the written document and the major advisor will inform the student if the written document is of sufficient quality to pass. If the student passes the written portion of the prelim exam, the oral examination will continue as scheduled. If the thesis committee determines that the written portion of the exam does not pass, the oral examination will be cancelled and rescheduled. In this case, the student is advised to ask the major advisor and other committee members for information regarding the reasons for failure of the written section. The advisor and committee members should be prepared to provide general information to the student regarding the general nature and degree of problems with the written documents (for example, "grammatical errors and typos were abundant and need correcting", or "major sections, such as the background, are missing and the research plan is so vague that the experimental design is not comprehensible").

The second submission of the written portion of the prelim exam will proceed to oral examination regardless of whether the written exam is deemed passable. At the second try, the student will have the opportunity to defend their written proposal regardless of pre-judged quality. If the student fails the written and/or oral exam, the student may, at the discretion of the thesis committee, be allowed to retake the oral exam. Only one retake of the oral exam is allowed.

b) *Oral*

The oral exam consists of a thesis proposal presentation followed by Q&A. To begin, prepare a brief (15-20 minute) presentation of your thesis proposal. Committee members are expected to hold their questions until after the student completes his/her presentation. Initial questions will be based on the written document/thesis proposal. Questions will then expand to include any topics relevant to the discipline and the student's program of study. Students are encouraged to form a

“mock” committee of other, often senior, students to practice fielding questions.

Written exam thesis proposal:

A creative proposal of your thesis project is written in the form of an NIH predoctoral PhD fellowship (F31) application (<http://grants.nih.gov/grants/guide/pa-files/PA-14-147.html>). The proposal should be limited to (single spaced, 11 point Arial font) 7 pages maximum for the narrative, excluding references. Use one-half inch margins (top, bottom, left, and right) for all pages. The proposal format and structure are described below.

Students are expected to have consulted with their major advisor regarding thesis proposal topics prior to developing the prelim exam proposal. However, faculty should not provide substantial input in the writing of the proposal. Faculty may 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.

Characteristics of a good thesis proposal:

- Builds on your area of expertise.
- Is hypothesis driven or addresses significant scientific need-based questions
- Is based on a subject about which enough is already known that specific and focused hypotheses or experimental questions 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 thesis proposal (adapted from NIH SF424 R&R Application Guide):

1. *Specific Aims* (1 page). State concisely the goals of the proposed research and summarize the expected outcome(s), including the impact that the results of the proposed research will exert on the research field(s) involved. List succinctly the specific objectives of the research proposed, *e.g.*, to test a stated hypothesis, create a novel design, solve a specific problem, challenge an existing paradigm or clinical practice, address a critical barrier to progress in the field, or develop new technology.
2. *Research Strategy* (6 pages). Organize the Research Strategy in the specified order and using the instructions provided below. Start each section with the appropriate section heading—Significance, Innovation, Approach. Cite published experimental details in the Research Strategy section and provide the full reference in the Bibliography and References Cited section.

(a) Significance

- Explain the importance of the problem or critical barrier to progress in the field that the proposed project addresses.
- Explain how the proposed project will improve scientific knowledge, technical capability, and/or clinical practice in one or more broad fields.
- Describe how the concepts, methods, technologies, treatments, services, or preventative interventions that drive this field will be changed if the proposed aims are achieved.

(b) *Innovation*

- Explain how the application challenges and seeks to shift current research or clinical practice paradigms.
- Describe any novel theoretical concepts, approaches or methodologies, instrumentation or interventions to be developed or used, and any advantage over existing methodologies, instrumentation, or interventions.
- Explain any refinements, improvements, or new applications of theoretical concepts, approaches or methodologies, instrumentation, or interventions.

(c) *Approach*

- Describe the overall strategy, methodology, and analyses to be used to accomplish the specific aims of the project.
- Discuss potential problems, alternative strategies, and benchmarks for success anticipated to achieve the aims.
- If the project is in the early stages of development, describe any strategy to establish feasibility, and address the management of any high risk aspects of the proposed work.
- Point out any procedures, situations, or materials that may be hazardous to personnel and precautions to be exercised.
- If research on Human Embryonic Stem Cells (hESCs) is proposed but an approved cell line from the NIH hESC Registry cannot be identified, provide a strong justification for why an appropriate cell line cannot be chosen from the Registry at this time. If an applicant has multiple Specific Aims, then the applicant may address Significance, Innovation and Approach for each Specific Aim individually, or may address Significance, Innovation and Approach for all of the Specific Aims collectively.

More information on writing an NIH-style grant proposal is available through the NIAID website at <http://www.niaid.nih.gov/researchfunding/grant/pages/newpiguide.aspx#new21>. This site includes helpful information on planning, formatting and writing NIH grants.

Final Defense:

- a) Writing the thesis: plan 4-6 months start to finish, writing part-time during this period.
- b) Students **MUST** obtain instructions for procedure, format and details for finishing the thesis from the university graduate school (http://gradschool.oregonstate.edu/sites/gradschool.oregonstate.edu/files/thesisguide2015-16_2.9.16.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) Before scheduling your thesis defense, you should prepare a list of:
- Papers published (full citation)
 - Papers submitted
 - Manuscripts in preparation
 - Regional and national meetings attended and source of funding
 - Honors/fellowships/awards received
 - Post graduation employment plans

Submit it to your major advisor and the Graduate Studies Committee (Kerry McPhail and Arup Indra, Co-directors). Your major advisor will hold off on signing your dissertation until this requirement is met.

- d) 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.
- e) **File all paperwork required by the Graduate School well in advance of the defense date.**

At least **15 weeks** before your Final Oral Defense of Dissertation submit [diploma application](#).

At least **2 weeks** before your Final Oral Defense of Dissertation:

- Schedule your Exam by submitting the [online Exam Scheduling Form](#) to the Graduate School
 - Submit pre-text pages to the Graduate School
 - Give dissertation to your whole committee
- f) Immediately after setting your defense date, prompt your advisor to contact Debra Peters (room 135 Pharmacy) **to advertise the seminar date as required by the University.**
- g) Provide chapters to your major advisor for review as they are completed; proofread and spell-check beforehand.
- h) Distribute the thesis, with the approval of your major advisor, 2 weeks before the final defense date.
- i) Defend your thesis starting with a 50 min seminar for the scientific community. Following the seminar, 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.
- j) Make final copies of your thesis after completing any revisions recommended by the committee and obtaining required signatures. **Please complete a graduate student final checklist (the form is available at the end of this document) before seeking the department chair's signature.** To avoid paying another semester's tuition, all documentation must be presented within Graduate School deadlines (two weeks into

the next term or six weeks from the defense date, whichever is earlier – check with the Graduate School)

- 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).
- One hardbound copy for your major advisor.
- One hard bound copy for the pharmacy library.
- One hard bound copy for your parents.

k) Celebrate your hard-earned achievement and find a real job.

Course Curricula:

Pharmacology, Ph.D. requirements

Pharmacology is the study of mechanisms of drug action and of potential new drug targets. Research in pharmacology requires a wide array of knowledge and techniques developed in different biomedical disciplines. CoP Pharmacology faculty members emphasize research in areas related broadly to cellular signaling and transcriptional regulation, but utilize experimental *in vivo*, biochemical, cellular, molecular genetics, and systems and computational techniques. Accordingly, course curricula in the graduate program in pharmacology will vary from student to student and should be discussed early with major advisor or first rotation advisor. Students on assistantships should register for a minimum of 16 credits, filling out the schedule with research credits or elective courses in addition to required courses and seminar credits until all didactic courses on the program of study are completing. Before choosing a thesis laboratory, students on teaching assistantships are required to complete three laboratory rotations (one per quarter) in Pharmaceutical Sciences during the first year of their program.

Required Curriculum for Pharmacology Students

- Minimum 3 research rotations (PHAR 601) of 3 – 5 credits each fall, winter, spring, year 1
- Seminar (Phar 507, 1 credit) every academic term, every year
- Biochemistry I, II and III (BB 590, 591, 592, 3 credits each), fall, winter and spring terms respectively, in year 1.
- Foundations of Drug Action I and II: (PHAR 735, 527/737, 3 credits each, fall and winter terms, respectively) in year 1
- A scientific ethics course, e.g. Scientific Skills and Ethics (MCB 557, 3 credits), spring term; or Responsible Conduct of Research (GRAD 520, 1 credit), offered most terms
- Introduction to Grant Proposal Writing (PHAR 669, 1 credit), fall term

Highly recommended courses include Genome Organization, Structure and Maintenance (MCB 554, 4 credits, fall term), and Genome Expression and Regulation (MCB 555, 4 credits, winter term) and are required for certain laboratories.

All students will be expected to demonstrate knowledge of pharmacological principles during the preliminary exam that are covered in PHAR 527/737. Students are encouraged but not required to complete Foundations III: Autonomic Pharmacology (PHAR 526, spring terms) or one or more terms of Pharmacology I, II, III (PHAR 591, 592, 593, 5 credits each, fall, winter and spring, respectively) or Cancer and Chemoprevention (PHAR 563, spring term) or Cancer Systems Biology (VMB 651, spring term), focusing on areas related to their research. Students with future interests in teaching pharmacology in an academic position are especially encouraged to complete courses in the Pharmacology I, II and III series.

The Biochemistry series (BB 590, 591 and 592) is required but may be waived for students who have completed an upper level undergraduate series in biochemistry.

Students lacking undergraduate coursework in physiology are urged to consult with their advisor.

A complete graduate program at OSU requires 27 didactic (not research, internship or seminar) course credits. Students will need to choose elective courses in consultation with their advisor and approved by program committee. Some suggestions are listed below but others are available on campus.

For students interested in systems and computational approaches, the new Biological Data Sciences graduate minor at OSU has coursework, including a capstone course, that provides training designed to meet the needs of students from a wide variety of backgrounds. Students and advisors should consult the list of coursework designed for this program and contact the program director, Brett Tyler, with questions.

Elective courses of potential interest to Pharmacology graduate students

Hormone Action: MCB/ANS 662 (Winter term, even years)

Methods of Data Analysis: ST 511, 512, 513 (Most terms)

Molecular Therapeutics, Discovery and Development, TOX 699 (Spring term)

Techniques in Molecular and Cellular Biology, MCB 525 (early September offering)

Immunology, MB 516 (Fall term)

Mathematical Modeling of Biological Systems, VMB 631 (Winter term)

Special topics in Biochemistry: BB 650, 651, 652 (All terms)

Lipid metabolism: ANS 560 (Winter term)

Introduction to Systems Biology, VMB 670 (Winter term)

Cancer Systems Biology, VMB 651 (Spring term)

Pharmaceutics Ph.D. Requirements

Prerequisites: Students must be proficient in using computers. Insufficient computer skills may be remedied with undergraduate coursework, e.g., CS101. Students whose undergraduate degree is not in the pharmaceutical sciences or pharmacy must take Phar 733 and/or 734 to increase their background knowledge. Students are also expected to have or obtain a math background equivalent to the courses listed below.

The required curriculum for Pharmaceutics student is:

- Minimum 3 research rotations (PHAR 601) of 3 – 5 credits each fall, winter, spring in year 1
- Foundations of Drug Action I: (PHAR 735, 3 credits)
- Seminar (PHAR 507, 1 credit) every term every year
- A scientific ethics course, e.g. Scientific Skills and Ethics (MCB 557, 3 credits), spring term; or Responsible Conduct of Research (GRAD 520, 1 credit), offered most terms
- Introduction to Grant Proposal Writing (PHAR 669, 1 credit), fall term

Other Possible Courses (Please discuss with your major advisor)

Pharmaceutics I	PHAR 733 (3)
Pharmaceutics II	PHAR 734 (3)
Calculus+	MATH 251, 252, 253, or 254
Bioanalytical Chemistry	CHEM 524 (3)
Physical Chemistry	CHEM 540 (3), 541 (3)
Radiotracers Chem	CHEM 519 (3)
Biochemistry	BB 590 (4), 591 (3), 592 (3)
Current Topic	PHAR 573 (6-9 credits)
Statistics	ST 511, 512, 513, 551, 552, 553, 521, 522, 515, 531
Immunology (3)	MB 516
Pharmacokinetics	PHAR 750/572
Nanomedicine I	PHAR 574
Advanced Pharmaceutics	PHAR 770
Cancer Biology	CELL 616 (OHSU)
Tissue Biology	CELL 613 (OHSU)
Advanced Xenobiotic Metabolism & Disposition	TOX 575 (2)
Vaccines and New Therapies	VMB 674 (3)

Medicinal Chemistry, including Bioorganic Chemistry and Natural Products Chemistry

Course requirements for two possible tracks within medicinal chemistry, bioorganic chemistry or molecular biology/biochemistry, are detailed below. Students will need to consult with their major advisor to discuss tracking and choice of electives.

Required courses for all medchem/natural products graduate students

PHAR 601 (year 1)	3 research rotations each fall, winter, spring	3 – 5 credits
PHAR 507	Seminar, every academic term, every year	1 credit
PHAR 735	Foundations of Drug Action	3 credits (fall)
PHAR 669	Introduction to Grant Proposal Writing	1 credit (fall)
MCB 557 (spring) OR	Scientific Skills and Ethics	3 credits
GRAD 520	Responsible Conduct of Research	1 credit
BB 590, 591	Biochemistry (fall, winter)	6 credits
CH 535	Structure Determination by Spectroscopic Methods	3 credits (fall)
PHAR 537	Bioorganic Chemistry (Biosynthesis) (spring)	3 credits

Electives (at least 3 courses)

Suggested Courses for the Bioorganic Chemistry Track

CH 630, 631	Advanced Organic Chemistry	6 credits (fall, winter)
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Suggested Courses for the Molecular Biology/Biochemistry Track

MCB 525 (summer)	Techniques in Molecular and Cellular Biology	3 credits
BB 592 (spring)	Biochemistry 3: Genetic Biochemistry	3 credits
<u>Other Possible Electives</u>		
CH 661	Separations: Chromatography & Related Methods	4 credits (fall)
BB 654	Proteins	3 credits
BB 593, 594, 595	Biochemistry Lab 1,2,3	3 credits/term
CH 636, 637, 638	Selected Topics in Organic Chemistry	3 credits/term
CH 697	Mass Spectrometry of Organic Compounds	4 credits
CH 524	Bioanalytical Chemistry	3 credits (spring)
MB 556	Microbial Genetics and Biotechnology	3 credits
MB 668	Bioinformatics and Genomics (first module)	2 credits (spring)
MB 516	Immunology	3 credits (fall)
MB 530	Bacterial Pathogenesis	3 credits (spring)
MCB 554	Genome organization, structure, maintenance	4 credits (fall)
MCB 555	Genome Expression and Regulation	4 credits
ST 511	Methods of Data Analysis	4 credits (fall)
TOX 575	Advanced Xenobiotic Metabolism & Disposition	2 credits (fall)

The OSU Biological Data Sciences graduate minor provides training designed to meet the needs of students from a wide variety of backgrounds. Students and advisors interested in systems and computational approaches should consult the list of coursework designed for this program and contact the program director, Brett Tyler, with questions.

<http://cgrb.oregonstate.edu/training/bls>

NOTE: The forms on the following pages are available online at:
<http://pharmacy.oregonstate.edu/phd-student-resources>

PHARMACY GRADUATE STUDENT ROTATION EVALUATION FORM

STUDENT:
INSTRUCTOR:
YEAR AND QUARTER:

Please evaluate the student's performance in the listed categories; use numerical scores of 1 (poor) to 5 (excellent) and provide explanatory or additional comments.

Acquired knowledge (1-5)___.

Ability to work with others (1-5)___.

Maturity (1-5)___.

Effort (1-5)___.

Laboratory Skills (1-5)___.

Communication (1-5)___.

Overall average (1.0-5.0)___.

GRADE for this rotation ___.

(4.5 - 5.0 = A, 4.0 - 4.5 = A-, 3.5 - 4.0 = B+, 3.0 - 3.5 = B, 2.5 - 3.0 = B-, 2.0 - 2.5 = C, less than 2.0 = F)

Please provide detailed explanations of grades at either extreme (*i.e.* A, or C or less)

Additional comments:

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

Student Signature _____ Date _____

Mentor Signature _____ Date _____

When the form is completed, please make a copy for yourself and send the original to Debra Peters.

Pharmacy Graduate Student Annual Assessment of Progress

Name:

Advisor:

Date:

Year in program:

Please rate yourself on a scale of one to five. 1=I am not making progress towards this goal, 3= I feel that I am progressing adequately, 5= I feel my performance towards this goal is outstanding beyond expectations. Use NA for anything not applicable to your project. A majority of “3”s would be considered “normal”.

	Goal	Student Score	Advisor Score
1	Am making progress in attainment of last year's goals		
2	Have applied significant effort toward attainment of last year's goals		
3	Understand and effectively use modern, innovative methods pertinent to the discipline		
4	Display excellent oral and written communication skills.		
5	Complete experiments or other tasks with attention to detail, appropriate use of equipment, methodological approaches, and all appropriate controls		
6	Demonstrate intellectual curiosity and creativity		
7	Interact well and work effectively with others		
8	Demonstrate appropriate independence in development and execution of thesis project		
9	Communicate research findings (e.g., publications, abstracts, presentations)		
10	Display excellent work habits and attitudes with a high potential to productively enter the research workforce.		
11	Ethically conduct research in all environments		
12	Work safely in all areas with concern for self and others		
13	Display skills to mentor and train future researchers in the discipline		
14	Demonstrate understanding of and protection for privacy concerns when dealing with patient-specific information		

Student Section: Please write an overall evaluation of your academic and research progress over the past 12 months and your goals for the coming year, including an action plan for scores of 2 or less in any areaⁱ. Please discuss this completed form with your advisor, noting any areas of discrepancy in evaluationⁱⁱ. For PhD students in year 4 of the program, please note your anticipated date of graduation and plans for timely completion.

Advisor Section: Please provide an overall evaluation of the student's academic and research progress over the past 12 months, and your goals for the student for the coming year, including an action plan for scores of 2 or less in any areaⁱⁱⁱ.

ⁱ Advisors may consult with your thesis committee or subsequently the Graduate Studies committee regarding recurrent inadequate progress on action plans in deficient areas. The Graduate Studies committee may ultimately take action on unremediated inadequate progress.

ⁱⁱ Students should discuss areas of discrepancy or concern first with their thesis advisor. However, the thesis committee and the Graduate Studies committee may be helpful in the event that disagreements over major concerns are not resolved.

ⁱⁱⁱ Advisors are encouraged to consult with the student's thesis committee and subsequently the Graduate Studies committee, if needed, regarding recurrent inadequate progress on action plans in deficient areas.

I verify that I have discussed this completed evaluation with my advisor

Student signature: _____ Date: _____

I verify that I have discussed this completed evaluation with my student

Advisor signature: _____ Date: _____

Please sign and date this evaluation form. Retain a copy for yourself. Advisor should send the completed original to Debra Peters.

A Guide to Pharmacy Graduate Programs 2017-2018

Ph.D. PRELIMINARY EXAM in Pharmacy Student Evaluation and Scoring Guide

Candidate Name: _____ Date: _____

Evaluation/Guidance	Does not meet Expectations	Meets Expectations	Exemplary Performance
1. Problem Definition: States the research hypothesis clearly and understands the gap in knowledge			
2. Background: Demonstrates sound knowledge of literature in the research area, and of prior work on the specific research problem			
3. Impact of Proposed Research: Demonstrates the potential value of the proposed research problem in advancing knowledge within the area of study and significance to improving health			
4. Approach: Provides a sound plan for applying state-of-the-art research methods/tools to testing the hypothesis, shows a good understanding of how to use methods/tools effectively, describes the limitations of the methods and provides appropriate alternatives			
5. Expected Results: Provides a sound plan for analyzing and interpreting research results/data, including appropriate use of statistics			
6. Timeline: Has developed an appropriate timeline for completion of the proposal given the Approach			
7. Quality of Written Communication: Communicates research proposal clearly and professionally in written form			
8. Quality of Oral Communication: Communicates research proposal clearly and professionally in oral form			
9. Critical Thinking: Demonstrates capacity for critical thinking and problem solvent relevant to the capability to conduct independent research in the area of study			
10. Broader Impact: Demonstrates awareness of broader implications of the proposed research. Broader implications may include social, economic, technical, ethical, business, etc. aspects.			
11. Ethical Aspects: Demonstrates awareness of ethical aspects of the proposed research and tenets of responsible conduct of research in general			
12. Subject Area Mastery: Demonstrates mastery of the subject areas encompassed by one of the sub-disciplines of pharmaceutical sciences, i.e., pharmacology, medicinal chemistry or pharmaceutics			

Overall Assessment: based on the evidence provided in items 1 – 12 above.

CRITERIA	PERFORMANCE RATINGS for PRELIMINARY EXAM		
	Does NOT PASS Exam	PASSES Exam	
OVERALL, My rating of this preliminary exam is:	Does not meet expectations	Meets expectations	Exemplary performance

Examiner/Major Advisor: Please use the reverse side of this form for written commentary. In particular, please provide an explanation for any items scored as “does not meet expectations” or detailed comments if the student does not pass. Please provide a copy of this completed evaluation form to the student and return the original SIGNED version to Debra Peters, 115 Pharmacy.

Ph.D. PRELIMINARY EXAM in Pharmacy Student Evaluation, Written comments on performance.

Name of the Examining Committee Member/Major Advisor: _____

Signature of the Examining Committee Member/Major Advisor: _____

M.S. THESIS DEFENSE EXAM in *Pharmacy* Student Evaluation and Scoring Guide

Candidate Name: _____ Date: _____

Evaluation/Guidance	Does not meet Expectations	Meets Expectations	Exemplary Performance
1. Problem Definition: States the research hypothesis clearly			
2. Background: Demonstrates sound knowledge of the literature and of prior work on the specific research problem			
3. Impact of Proposed Research: Explains the significance of the research and its value in advancing knowledge within the area of study and significance to improving health			
4. Approach: Used appropriate research methods/tools to test the hypothesis, and can explain the principles behind the methods and limitations			
5. Results: Data was appropriately analyzed and interpreted. Figures were clear, complete and indicated appropriate statistical analysis			
6. Discussion: The results were connected with prior research in the field in a detailed and scholarly manner			
7. Quality of Written Communication: The thesis was written clearly and professionally with minimal technical errors			
8. Quality of Oral Communication: The oral presentation of the thesis was clear and professional, including the quality of any supporting media such as powerpoint slides			
9. Critical Thinking: Responded thoughtfully, fully and clearly to public questions			
10. Ethical Aspects: Student provides assurance that all aspects of the thesis research were conducted ethically and demonstrates awareness of the implication of that assurance			

Overall Assessment: based on the evidence provided in items 1 – 10 above.

CRITERIA	PERFORMANCE RATINGS for M.S. THESIS DEFENSE EXAM		
	<i>Does NOT PASS Exam</i>	<i>PASSES Exam</i>	
OVERALL, My rating of this M.S. thesis defense exam is:	Does not meet expectations	Meets expectations	Exemplary performance

Examiner/Major Advisor: Please use the reverse side of this form for written commentary. In particular, please provide an explanation for any items scored as “does not meet expectations” or detailed comments if the student does not pass. Please provide a copy of this completed evaluation form to the student and return the original SIGNED version to Debra Peters, 115 Pharmacy.

M.S. THESIS DEFENSE EXAM in Pharmacy Student Evaluation, Written comments on performance.

Name of the Examining Committee Member/Major Advisor: _____

Signature of the Examining Committee Member/Major Advisor: _____

Ph.D. THESIS DEFENSE EXAM in Pharmacy Student Evaluation and Scoring Guide

Candidate Name: _____ Date: _____

Evaluation/Guidance	Does not meet Expectations	Meets Expectations	Exemplary Performance
1. Problem Definition: States the research hypothesis clearly and understands the gap in the knowledge.			
2. Background: Demonstrates sound knowledge of the literature and of prior work on the specific research problem			
3. Impact of Proposed Research: Explains the significance of the research and its value in advancing knowledge within the area of study and significance to improving health			
4. Approach: Used appropriate and state-of-the-art research methods/tools to test the hypothesis, and can explain the principles behind the methods and limitations			
5. Results: Data was appropriately analyzed and interpreted. Figures were clear, complete and indicated appropriate statistical analysis			
6. Discussion: The results were connected with prior research in the field in a detailed and scholarly manner			
7. Quality of Written Communication: The thesis was written clearly and professionally with minimal technical errors			
8. Quality of Oral Communication: The oral presentation of the thesis was clear and professional, including the quality of any supporting media such as powerpoint slides			
9. Critical Thinking: Responded thoughtfully, fully and clearly to public questions			
10. Ethical Aspects: Student provides assurance that all aspects of the thesis research were conducted ethically and demonstrates awareness of the implication of that assurance			
11. Publications: At least one peer-reviewed journal article or book chapter has been published or submitted based on this research			

Overall Assessment: based on the evidence provided in items 1 – 11 above.

CRITERIA	PERFORMANCE RATINGS for Ph.D. THESIS DEFENSE EXAM		
	Does NOT PASS Exam	PASSES Exam	
OVERALL, My rating of this Ph.D. thesis defense exam is:	Does not meet expectations	Meets expectations	Exemplary performance

Examiner/Major Advisor: Please use the reverse side of this form for written commentary. In particular, please provide an explanation for any items scored as “does not meet expectations” or detailed comments if the student does not pass. Please provide a copy of this completed evaluation form to the student and return the original SIGNED version to Debra Peters, 115 Pharmacy.

Ph.D. THESIS DEFENSE EXAM in Pharmacy Student Evaluation, Written comments on performance.

Name of the Examining Committee Member/Major Advisor: _____

Signature of the Examining Committee Member/Major Advisor: _____

Graduate Student Summary Report OSU College of Pharmacy

Student Name:

Student ID Number:

Major Professor:

Degree Obtained:

Date of Graduation:

Papers published (full citation):

Papers submitted:

Manuscripts in preparation:

Regional and national meetings attended and source of funding:

Honors/fellowships/awards received:

Post graduation employment plans:

Other comments/suggestions you would like to share with us:

Please return this form to your advisor and as an email attachment to Dr. Kerry McPhail (Kerry.McPhail@oregonstate.edu).

**OSU College of Pharmacy
Graduate Student Travel Grant Application Form**

Date of Application:

Student Name:

Student ID Number:

Year in the Pharm. Sci. Graduate Program:

Major Professor:

Event or Conference Name:

Depart Date:

Return Date:

Destination:

Is this your first regional or national meeting after enrolling in the PS Graduate Program?

YES / NO

Title of paper (please indicate whether it is a podium or a poster presentation):

Estimated Expenses for Trip:

(Please provide a detailed estimated budget. If partial funding is to be provided by the PI or a third party, please specify)

Major Professor's Signature _____

Date _____

Please return this form as email attachment to Dr. Kerry McPhail (Kerry.McPhail@oregonstate.edu).

COLLEGE OF PHARMACY GRADUATE STUDENT FINAL CHECK LIST
(TO BE COMPLETED BEFORE SEEKING THE DEPARTMENT CHAIR'S SIGNATURE)

STUDENT INFORMATION

Student Name:

Student ID Number:

Thesis Advisor:

Degree Obtained:

Date of Graduation:

ACTIVITIES AND FORMS TO BE COMPLETED AND/OR SUBMITTED

Thesis Defense Exam Evaluation Form

Submitted on _____ to _____
Date Name Signature

Graduate Student Final Summary Report

Submitted on _____ to _____
Date Name Signature

Exit interview with Director of Pharmacy Graduate Programs

on _____
Date Signature

NOTES

Please submit this form to the Department Chair when you ask for their signature