

UNIVERSITY *of* WASHINGTON
MEDICINAL CHEMISTRY

STUDENT HANDBOOK OF POLICIES & GUIDELINES

Ph.D. Program in Medicinal
Chemistry

2022-2023

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ABOUT THIS DOCUMENT

This Handbook details the expectations and requirements of graduate students in the Medicinal Chemistry Ph.D. Program. The rules, policies and information contained here are all subject to change, and an updated Handbook will be issued each year reflecting any changes. Students are expected to meet the graduation requirements and expectations codified in the Handbook the year they entered the program.

Questions about any of the material covered here may be addressed to the Graduate Program Coordinator or Graduate Program Advisor (contact information listed below).

Graduate Program Coordinator: Abhinav Nath, anath@uw.edu

Graduate Program Advisor: Sarah Lenti, lenti@uw.edu

ABOUT OUR DEPARTMENT

The Department of Medicinal Chemistry is part of the highly collaborative, interdisciplinary School of Pharmacy. Medicinal Chemistry is a discipline with a traditional focus on organic synthetic chemistry with the broad goals of drug discovery and optimization. The Department of Medicinal Chemistry has always departed somewhat from this tradition given the focus of many of its faculty on the research areas of mechanistic drug metabolism, toxicology, and bioanalytical chemistry.

Research in medicinal chemistry encompasses a broad spectrum of activities including studies pursuant to investigations of the interaction of both drugs and toxic substances with biological systems, and the relationship of chemical structure and dynamics to biological effect and function. In recent years research activities in the Department have been broadened further by the addition of several faculty members with expertise in the areas of biological mass spectrometry and biophysical virology.

Our **VISION** is to provide an outstanding learning and research environment by cultivating a collegial, inclusive, and interdisciplinary community. This community shares an intellectual passion for the fundamental molecular sciences that explain disease and therapeutic mechanisms, drug design and drug development. The Medicinal Chemistry departmental mission is focused on training leaders in all aspects of pharmaceutical sciences including clinical practice, basic research, and teaching.

The students, staff and faculty of Medicinal Chemistry share the following **VALUES**:

- A departmental community that is inclusive, equitable, collaborative, and representative of broader society strengthens our research and teaching missions.
- Discrimination or exclusion based on individual characteristics and circumstances – including race, gender, age, disability, ethnicity, national origin, sexual orientation, socio-economic status, or other similar distinctions – is unjust, representing a denial of opportunity for self-fulfillment and a waste of talent.
- Patterns of inequity and under-representation in the Department community can and must be challenged through positive action.
- Individuals have the right to hold their own opinions and beliefs, but these cannot be allowed to manifest in ways that are hostile or degrading to others.

THE DOCTOR OF PHILOSOPHY PROGRAM

The Doctor of Philosophy (Ph.D.) is the highest degree offered by the University of Washington and prepares the recipient for a career of creative scholarship. The Ph.D. is a research degree and is not conferred simply as a certificate to a prescribed course of study. The Department has the responsibility to assure that the degree will be granted only to candidates who have demonstrated independent scholarly research and creative thinking. Therefore, in addition to performance in didactic aspects of the graduate program, the final determination of whether graduate trainees meet the requirements for a Ph.D. will include assessment of the originality, significance, and quality of their research.

The University, its Graduate School, and Departments have the responsibility to provide the most favorable environment possible in which graduate students can develop their maximal potential for creative scholarship and independent research. This environment includes the following:

- the graduate faculty,
- instructional offerings,
- research facilities,
- library resources, and
- a stimulating and supportive group of capable graduate student colleagues.

PROGRAM OBJECTIVES

The doctoral degree program in Medicinal Chemistry trains research scholars in the fundamental aspects of drug metabolism and disposition, drug design, and disease mechanism. Broadly speaking, we seek to understand how drugs and toxins interact with their biological targets and with detoxifying enzymes and transporters, as well as to uncover the chemical and biochemical bases of cardiovascular, degenerative, developmental, and infectious diseases. Students in our Ph.D. program will gain technical expertise in varying combinations of bioanalytical chemistry, biophysical methods, computational approaches, and clinical studies.

PROGRAM REQUIREMENTS

Graduate students in Medicinal Chemistry must satisfy the general requirements of the Graduate School in addition to the requirements of the Department. A full description of requirements of the Graduate School can be found on their website: <http://www.grad.washington.edu>. Some of the pertinent requirements of the Graduate School and Department are described below:

1. **Residence:** A minimum of three academic years of resident study is required, two of them being at the University of Washington. Residence is defined as **10 credits per quarter (A,W,Sp) or 2 credits during summer quarter**. Only courses numbered 300 and above count toward residence. Thesis research must be conducted at the University of Washington, unless the research is of a collaborative nature requiring off-campus facilities.
2. **Credits and Scholarship:** A minimum of **25 credits** of graded course work, exclusive of thesis and non-thesis research, must be satisfied. This includes at least 16 credits of required 'core' courses. An average grade point of 3.0 in all numerically graded courses numbered 300, 400, and 500 is required to remain in good academic standing with the Graduate School and to take the General Exam. For the Graduate School, a minimum passing grade in any given course is 1.7, and any grade below that receives a "0" for a grade. Students may be required to retake any course in which they receive a grade below 3.0. Core and elective course requirements are listed in [Didactic Training](#), below.
3. **Teaching Experience:** A minimum of **two quarters of teaching assistantship (TA)** experience is required for the Medicinal Chemistry Ph.D. Usually, you will not be asked to assist more than one class per academic quarter (< 12 contact hrs/week). Most students will complete this requirement during the first three years in the program. Students rarely perform more than two quarters as a TA.

Students who receive an offer to TA anywhere other than Medicinal Chemistry should discuss it with their advisor. Please note that TAing for another department does not substitute for the Medicinal Chemistry requirement.

4. **Examinations and Progress Evaluation:** All graduate students must participate in the departmental examination program. A series of preliminary, **cumulative** (written) examinations and a **general** (oral) examination is required for advancement to Ph.D. candidacy; a **final** examination (defense of the thesis) is required for the degree. In addition, the Department of Medicinal Chemistry administers a 'pre-general' discussion with faculty to prepare students for the University-sanctioned General Exam.

See [Appendix A](#), "Progression Steps in Relation to the Doctoral Degree," for an overview of major milestones leading to the doctoral degree and scheduling details of the general and

final examinations. [Appendix A.3](#) also describes the cumulative examinations, which precede the general oral exam. [Appendix B](#) provides details about the formation of a doctoral supervisory committee and its role in the general exam and thesis defense. [Appendix C](#) provides details about the structure and conduct of the general oral exam.

5. **Seminars:** All graduate students must present **at least 3 seminars** while in the doctoral program (MEDCH 520). In addition, students will typically give a research rotation talk during Spring Quarter of the first year (MEDCH 582). From their 2nd year onwards, students will present papers from current literature (or on other topics as appropriate) at least once a year in MEDCH 582. See [Appendix D](#), "Training in Oral Communication through Seminars and Journal Club" for additional details.

The Department does not offer a terminal master's degree program, but students that do not satisfy the above requirements for a Ph.D. may request a master's degree. This request will be considered by the faculty on a case-by-case basis.

SERVICE, CLIMATE, AND SUPPORT RESOURCES

In addition to the Program Requirements described [above](#), the Department also expects that students will contribute positively to the environment of the Department, the University, and the broader community. This service may take the form of involvement with Department or School committees, participation in recruitment and other Department activities, involvement with academic societies or student organizations, outreach and volunteering activities, or service as a Student Representative as described below.

Student Representatives

Graduate students are represented in quarterly faculty meetings and other discussions with faculty by a panel comprised of one member from each of the following cohorts, elected or otherwise selected by their peers: 1st-year students; 2nd-year students; 3rd-year students; 4th-year students; students in their 5th or later years; postdoctoral researchers. Students may determine procedures for nomination, selection, and term limits of Representatives. Student Representatives are responsible for communicating the opinions and concerns of their peers to the Department community. Student Representatives will be invited to open faculty meetings at least once per quarter and will have the opportunity to submit agenda items for discussion.

Reporting Concerns

The Department is committed to providing a supportive, collegial, equitable environment for all members of our community, including mechanisms for students to report any incidents or behavior of concern. At any time, a student may request a confidential meeting with the Graduate Program Advisor, Graduate Program Coordinator, or Chair to discuss an issue relating to Department climate or to interactions with another member of the Department community. No identifying information will be shared with any other party without the advisee's agreement. Similarly, no steps towards resolution will be taken without the advisee's consent.

The Graduate Program Advisor (currently Sarah Lenti) also hosts weekly office hours as another venue for trainees to share any concerns or address questions as they arise.

Students can also use the anonymous School of Pharmacy Online Bias Reporting Tool (<https://sop.washington.edu/about/bias-and-misconduct-resources/>).

Support Resources

Other resources available to graduate students include:

- The Health Sciences Liaison & Counselor (currently Jen Nguyen) provides free and confidential services. Connection with counseling support is available without an appointment on [Tuesdays from 5 to 6 PM \[washington.zoom.us\]](#) and on [Fridays from 12:30 to 1:30 PM \[washington.zoom.us\]](#) (registration opens 5 minutes before each session).
- UW Allies program (<http://sites.uw.edu/uwallies>)

- School of Pharmacy Diversity, Equity, and Inclusion Committee - [Resource Page](#)
- The Office of the Ombud (<https://www.washington.edu/ombud/>) provides resources and facilitation for preventing, managing, and resolving conflict at the university.
- The University Complaint Investigation and Resolution Office (UCIRO, <https://www.washington.edu/compliance/uciro/>) formally investigates complaints of discrimination and retaliation.
- The Counseling Center (<https://wellbeing.uw.edu/topic/mental-health/>) and “Let’s Talk” (<https://wellbeing.uw.edu/virtual-lets-talk/>) connect students with mental health care and counseling resources.
- UAW4121 (<https://www.uaw4121.org/>), the Union of Academic Student Employees & Postdocs at the UW provides resources and support independent of the University.
- Short-term loans are available through the UW Office of Student Financial Aid (<https://www.washington.edu/financialaid/types-of-aid/loans/short-term-loans/>) and the School of Pharmacy Emergency Fund (<https://sop.washington.edu/pharmd/handbook/student-affairs/emergency-loans/>).
- The UW Food Pantry (<https://www.washington.edu/anyhungryhusky/the-uw-food-pantry/>) provides shelf-stable food, produce, ready-to-eat items, and hygiene products to students, staff, and faculty at no cost.
- GPSS – [Campus and Community Safety Resources](#)

Examples of Outreach and Volunteering Opportunities

- Serve as a mentor or coordinator for Student Mentor Program, a student run mentorship program where incoming students are matched with experienced grad students
- Serve as a Cohort Student & Postdoc Representative at Quarterly Faculty Meetings
- Serve as a Student Representative to the School of Pharmacy Senior Leadership Committee
- Participate in leadership of the UW student chapter of the American Association of Pharmaceutical Scientists (AAPS)
- Serve on the School of Pharmacy Diversity, Equity & Inclusion Council
- GPSS Senator representing graduate students in the School of Pharmacy
- UAW Local 4121 Union Departmental Representative for Med Chem
- Represent the School of Pharmacy at recruitment conference events like [SACNAS](#), [ABRCMS](#) or UW Graduate School Fair
- Volunteer to be on the Med Chem Admissions Committee, to review blinded applications during recruitment season
- Volunteer for Med Chem Recruitment Days:
 - Be part of prospective student visit planning committee
 - Campus tour
 - Meet & Greet – department tour
 - Living in Seattle Q&A



- Neighborhood/sightseeing tour
- Organize/participate in student dinner/social event
- Present a poster at poster session
- Set-up/clean-up for poster session
- Help with maintaining/updating Recruitment Days website
- Volunteer to create or help maintain your lab's website or social media
- Volunteer to judge projects at science fairs such as Central Sound Regional Science & Engineering Fair (CSRSEF)
- Coordinate student-invited speaker visit
- Volunteer for Med Chem related conferences
- Volunteer at the UW Undergraduate Research Symposium
- Participate in registered student organization such as oSTEM or WiSTEM

DIDACTIC TRAINING

Course work for the doctoral program is divided into five components: (1) prerequisites for entry into the program; (2) a required Core Program; (3) elective courses, which are not required but encouraged when relevant to the student's research; (4) seminars and literature review; (5) research. Students may be excused from some classes in the Core Program based on advanced coursework (e.g., from a master's degree) or extensive experience in the relevant subject, and if the Thesis Advisor allows it. A minimum of 25 graded credits (Core plus electives) are required prior to the General Exam.

1. Prerequisites:

- Differential Calculus (6 credits)
- Organic Chemistry (6 credits not including lab)
- Physical Chemistry (3 credits including thermodynamics and kinetics is required; quantum mechanics is strongly recommended)
- Biochemistry (3 credits)

Candidates are accepted into the program on the condition that any deficiencies in course requirements are rectified by the end of Year 1.

2. Core Program: (17 graded credits)

Course	Comments
MEDCH 529, Advanced Medicinal Chemistry, 4 cr	Year 1, Autumn quarter
CHEM 530, Advanced Physical Organic Chemistry, 3 cr	Year 1, Autumn quarter
MEDCH 528, Biophysical Enzymology and Biopharmaceuticals, 2 cr	Year 1, Winter quarter (1 st half)
MEDCH 527, Drug Metabolism, 2 cr	Year 2, Winter quarter (2 nd half)
CHEM 532, Advanced Bio-Organic Chemistry, 3 cr	Year 1, Spring quarter
BIOC 530, Introduction to Structural Biology, 3 cr	Year 2, Autumn quarter

The Core Courses listed above should be completed within the first two years of the program. In addition, the following training is required:

- Biomedical Research Integrity Program (<https://depts.washington.edu/bhdept/bri>). Students must attend all five in-person or online trainings offered before completion of Year 2, although attendance at the Discussion sections is not required except for T-32 Training Grant recipients. (Students supported by the T-32 Pharmacological Sciences Training Program are subject to additional requirements and must attend three Discussion sections in addition to the lectures.)



- Training in the following areas through UW Environmental Health & Safety (<https://www.ehs.washington.edu/training>) should be completed by the end of Autumn quarter, Year 1:
 - Managing Laboratory Chemicals
 - Biosafety
 - Fire Extinguisher
 - Shipping Dry Ice
 - Fume Hood
 - COVID-19 Safety Training

In addition, training in topics such as Radiation Safety or Animal Care may be required based on a student's research activities.

- Training in the prevention of sex- and gender-based misconduct, through the UW Title IX office (<https://tixstudent.uw.edu/>).

3. Elective Courses: (min. 8 credits)

The purpose of elective coursework is to enhance the Core training. By its nature, it is highly individualized and should be geared to suit individual interests. Students are encouraged to take elective courses that might benefit their thesis projects and career goals. Relevant courses include, but are not limited to, those listed below. Students should discuss potential electives not on this list with their Thesis Advisor or the Graduate Program Coordinator.

- CONJ 531, Signaling Mechanisms in Excitable Cells (Autumn, 1.5 cr)
- PHCOL 502/CONJ 532, Signal Transduction from the Cell Membrane to the Nucleus (Autumn, 2 cr)
- PHCOL 501, Drug Discovery and Emerging Therapeutics (Autumn, 2 cr)
- PHCOL 503, Autonomic/Cardiovascular Pharmacology (Winter, 2 cr)
- PHCOL 504, Neuropharmacology (Winter, 2 cr)
- PHCOL 505, Endocrine Pharmacology (Spring, 2 cr)
- PHCOL 506, Immunopharmacology and Chemotherapeutics (Spring, 2 cr)
- MEDCH 541 Biological Mass Spectrometry (Spring, 3 cr);
- CHEM 531 Advanced Organic Chemistry (Winter, 3 cr).
- CHEM 460 Spectroscopic Molecular Identification (Autumn, 3 cr).
- B STR 520 Structure Based Design of Drugs (Winter, even years 3 cr).
- CHEM 524 Analytical Mass Spectrometry (Spring, 3 cr).
- PCEUT 506 Concepts in Pharmacokinetics (Winter, 3 cr).
- PCEUT 502 Drug Disposition Science (Autumn, 2 cr).

Students are encouraged to take any *two* of these half-quarter courses, to be completed by the end of Year 2. (Students in the Pharmacological Sciences Training grant are **required** to complete two of these courses.)



- PCEUT 513 Basic Concepts in Pharmacogenetics and Toxicogenomics (Winter, 3 cr).
- ENVH 533 Molecular Toxicology (Spring, 2 cr).
- PCEUT 586 Biotechnology and Biopharmaceutics (Spring, 3 cr).
- BIOEN 576 Laboratory Techniques in Protein Engineering (Spring, 4 cr).
- BIOST 514 Biostatistics I (Autumn, 4 cr).
- BIOST 515 Biostatistics II (Winter, 4 cr).
- MCB 532 Human Pathogenic Viruses (Autumn, odd years 3 cr).
- GENOME 555 Protein Technology (Autumn, 1.5 cr).

4. Seminars and Literature Review:

Students should enroll in the following classes on a CR/NC basis, every Autumn, Winter and Spring quarter until graduation:

- MEDCH 520, Seminar (1 cr)
- MEDCH 582, Topics in Medicinal Chemistry (a.k.a. "Monday Night Meeting", 1 cr)

See [Appendix D](#) for additional details on these two courses.

In addition, students should enroll in the 550-series course corresponding to their rotation mentor (for 1st year students) or Thesis Advisor (for all other students) for 1 credit on a CR/NC basis, every quarter (including Summer) until graduation:

- MEDCH 551, Flavin and Heme-Containing Monooxygenases (Rettie)
- MEDCH 552, Computational Peptide Design (Bhardwaj)
- MEDCH 553, Structure and Function of Macromolecular Protein Assemblies (Atkins)
- MEDCH 554, Biophysical and Structural Virology (Lee)
- MEDCH 555, Biophysics and Pharmacology of Dynamic Proteins (Nath)
- MEDCH 556, Clinical and Mechanistic Aspects of Drug Metabolism (Totah)
- MEDCH 557, Antibody-Antigen Interactions (Guttman)
- MEDCH 558, Glycans and Neurocognitive Disorders (Alonge)
- MEDCH 559, Biosynthesis, Metabolism, and Analysis of Lipids (Xu)

Finally, 2nd-year students should enroll in MEDCH 599 for 1 credit on a CR/NC basis, every quarter until they pass the Cumulative Exam ("cumes") requirements detailed in [Appendix A.3](#).

5. Research:

Students should enroll in one of the following variable-credit courses, on a CR/NC basis, every quarter. The number of credits should be adjusted to ensure that students are enrolled for a total of at least 10 credits (Autumn, Winter, or Spring) or 2 credits (Summer) every quarter. This is required to ensure that students remain in full time status with the Graduate School.

- Students who have not yet passed their General Exam should enroll in MEDCH 600.

- Students have passed their General Exam (i.e., advanced to Ph.D. candidacy) should enroll in MEDCH 800.

SELECTION OF A THESIS ADVISOR

Students in the Ph.D. program will choose a Thesis Advisor (a.k.a. Research Supervisor or Principal Investigator) from among the Graduate Faculty in the Department no later than the end of Spring quarter of Year 1. Students must notify the Graduate Program Coordinator of their preferences before the last week of Spring quarter. Agreement in the selection of an advisor must be a fully informed, mutual decision, and faculty members are not obligated to take every student that might choose them. The Department may not be able to accommodate every student's first choice of Advisor, for example because of previous commitments by the faculty to other students in the program, or laboratory space constraints. After a selection of Advisor is made and agreed to, further change is possible only by petition, with approval from the Department Chair.

The Thesis Advisor becomes the primary mentor, and shares responsibility with the student for their progression through the steps described in [Appendix A](#). The Thesis Advisor serves as chair of the student's Doctoral Supervisory Committee. In collaboration with the Committee, the Advisor is responsible for guiding the student's program of study and research.

In some cases, a student may choose to be jointly advised by two faculty members. If both faculty members agree, one of them shall serve as the primary mentor and chair the Doctoral Supervisory Committee.

FINANCIAL ASSISTANCE

Financial support for students enrolled in the Ph.D. program is available in the form of research assistantships, NIH-supported predoctoral training fellowships, and outside fellowships such as those from the American Foundation for Pharmaceutical Education and the pharmaceutical industry. Financial support is awarded annually when substantial progress toward the degree is being made, as evaluated as described in the next section, [Annual Performance Review and Reappointment](#). Students can expect to receive support for a period of at least 5 years if consistent progress is made towards the Ph.D. degree, and the period of support can be extended through petition.

ANNUAL PERFORMANCE REVIEW AND REAPPOINTMENT

Students will receive structured feedback on their scholarly and research activities every year, as outlined below. Students are required to prepare an Individual Development Plan (IDP) every year, summarizing their progress in didactic coursework and required trainings; research activities, plans, and obstacles; career goals, and relationship to research progress. Students will receive a template IDP along with a reminder email each Spring, and the IDP must be submitted to the Graduate Program Advisor by the deadline in that email. Students should promptly discuss their IDP with their Thesis Advisor, identifying strengths, weaknesses, and opportunities for improvement.

The Thesis Advisor will prepare a 1-page evaluation of the student's progress that will be submitted to the Department Chair. The Chair and Advisor (along with Supervisory Committee members, if necessary) will review the student's IDP and Advisor's evaluation and render a decision on reappointment. If significant deficiencies in the progress of a student are identified, a meeting between the student, Thesis Advisor and Department Chair will be scheduled to determine the appropriate course of action. This may include remedial work and more frequent milestones during the next year. Reappointment can be denied because of a failure to maintain good scholastic standing (e.g., GPA below 3.0) or a failure to make substantive research progress towards the degree.

The Advisor's evaluation, reappointment decisions, and details of financial support and benefits for the next year, will be communicated to the student by email, with a copy placed in the student's academic file.

Structured feedback from the student to their Advisor can also be very helpful in developing a successful and productive working relationship. Accordingly, students will have the option to prepare a short (~1 page) report on their Advisor's performance over the previous 12 months, including positive feedback and constructive criticism. This complements the preparation of the IDP and Advisor's evaluation described above. Once the student and Advisor have both prepared their reports, the student will have the option of meeting with their PI or the department Chair to discuss both reports, identify any issues to be addressed, and formulate a plan for the year to follow.



**Individual Development Plan (IDP) Rubric for Medicinal Chemistry
2021-22 Academic Year**

Every year, Med Chem students are expected to prepare and update an Individual Development Plan (IDP) describing their scholarly progress over the previous year, and discussing their work in the context of career goals. For the current year, IDPs should describe progress since May 2021 and goals for the upcoming academic year and through May 2023.

Students should prepare a report containing the following sections **or** an equivalently detailed IDP using a format approved by their PI:

Section 1: (~1 page)

1.1 Courses Completed

1.2 Status with respect to cumulative exams; target date for taking the General Exam

1.3 Meetings, Manuscripts, and Fellowships – conferences attended, posters/talks given, manuscripts submitted/published, fellowships obtained, awards received, etc.

1.4 Lab Safety - EHS Safety Training or BRI seminars attended

Section 2: (~2 pages)

2.1 Research Progress on rotations, research projects, or writing of the dissertation

2.2 Research Goals for the coming year

Please be detailed and thoughtful in appraising your performance over the previous year and in setting goals and targets for the coming year.

Section 3: (~1 page)

3.1 Career Goals - describing any changes over the previous year

3.2 Professional Development Activities - Completed or planned research activities, outreach, service, and other professional development activities that advance career goals

3.3 Networking with potential mentors and future colleagues

Please submit a PDF copy to Sarah Lenti (lenti@uw.edu) no later than Monday, June 6, 2022.

Example rubric for the Individual Development Plan



**UW Medicinal Chemistry – Advisor Feedback Template
2021–22 Academic Year**

This template is an **optional** yearly feedback mechanism for the use of graduate students in Medicinal Chemistry labs. Advisors or students may tailor this document to their needs.

If a student chooses to participate, they should be prepared to share their feedback with their Advisor or with the Department Chair **by June 6, 2022**. There is no obligation or expectation for students to participate if they do not wish to.

The template should be delivered to students no later than one week after they receive their notification to prepare their annual Individual Development Plan.

Students should address the following questions:

- Do you have enough contact time with your Advisor? Are you receiving enough feedback (or too much)? Do you have any suggestions for improvement?
- Are you happy with the direction of your project? If not, what changes do you suggest?
- Can you find help with your experiments when needed, from your Advisor or other colleagues (e.g., fellow grad students, postdocs, research scientists, other faculty)?
- Do you feel you are on track with your graduate school and career goals? How can your Advisor do better to help you to accomplish them?
- Do you have access to sufficient mental health support? How can your Advisor help with that?
- Do you have any other suggestions that can improve the mentoring relationship with your Advisor?

Example of Advisor Feedback Form

APPENDIX A: PROGRESS TOWARDS THE DOCTORAL DEGREE

1. Research Rotations

Students entering the doctoral program are required to complete 2–3 one-quarter research laboratory rotations, starting Autumn quarter of their first year. Students may opt to complete a rotation in the summer quarter before the initiation of classes. Since this option requires early admission to the Department, it must be requested as soon as possible after acceptance of an offer of admission.

Students should contact faculty members as early as possible to discuss potential rotation projects and logistics. Student preferences for specific labs will be followed as far as possible, subject to factors such as laboratory space constraints.

As detailed [above](#), students shall choose a Thesis Advisor no later than the end of Spring quarter in Year 1, through consultation with Rotation Advisors and the Graduate Program Coordinator. If a student is unable to match with a Thesis Advisor after three rotations, they may petition the Chair to allow a fourth rotation.

2. Development of Research Skills and Identification of a Thesis Topic

By the beginning of Year 2, students are expected to be participating fully and actively in the laboratory of their Thesis Advisor, and to begin discussions with their Advisor on identifying suitable thesis topics. These discussions should be accompanied by a comprehensive search of the literature to obtain a good understanding of the research to be addressed.

3. Cumulative Exams

Students are required to take and pass a series of cumulative exams (MEDCH 599, 1 cr) in their 2nd year to subsequently schedule the General Exam. The format is as follows:

- A total of six exams will be given to students in their second academic year: two each in Autumn, Winter, and Spring quarters. Each exam will be in a take-home format, with 24 or 48 hours allotted for completion. Exam dates will be determined by a consensus of the students sitting for the exam, coordinated by the faculty member who organizes the cumulative exam.
- Faculty will take turns preparing exam questions. A compilation of old exams can be obtained from the Graduate Program Advisor.
- Students must take every exam offered, and a missed exam counts as a failure.
- Exam questions will be graded by the respective faculty author. Pass/fail is decided by a faculty vote after each exam. A score of ≥ 70 constitutes an automatic pass. Borderline scores are evaluated for special consideration.

Students must pass three out of six exams attempted to become eligible for Ph.D. Candidacy status. In special circumstances, students may appeal to the Department Chair

for one-time exceptional consideration; any subsequent decision to alter the cumulative exam requirement would require the approval of the entire faculty.

4. Pre-General Seminar and Faculty Discussion

In Autumn quarter of Year 3, students shall prepare a written NIH-style research proposal (see [Appendix C.1](#) for format) and present a departmental seminar as part of MEDCH 520 outlining their proposed thesis research. The written proposal must be sent to the faculty at least one week before the pre-general seminar. The seminar will be followed by a round-table discussion with all available faculty members. This mechanism is intended to solicit faculty input on the design of the thesis project and the selection of committee members, identify potential knowledge gaps, and enable students to schedule the General Exam in a timely fashion. Note that the pre-general seminar is a Departmental Milestone rather than a Graduate School requirement, and is not graded. However, faculty may recommend additional coursework or modifications of research plans.

5. Appointment of Doctoral Supervisory Committee and Reading Committee

Members should be appointed to the Doctoral Supervisory Committee and Reading Committee following the requirements described in [Appendix B](#), soon after the pre-general seminar has been completed satisfactorily.

6. Scheduling of General Exam

The General Exam includes both a written proposal and a presentation, both described in [Appendix C](#). Note that the written proposal must be sent to the Committee at least two weeks before the General Exam. Upon passing the General Exam, a student advances to Ph.D. Candidacy. The General Exam may be scheduled at least four months after the Doctoral Supervisory Committee has been formed, and a date is generally selected in consultation with the Thesis Advisor and Committee Members. Scheduling requests must be submitted via MyGrad (<http://www.grad.washington.edu/mygrad/student.htm>) at least three weeks before the desired date. At least four members of the Supervisory Committee, including the Chair, Graduate School Representative (GSR), and one other member of the Graduate Faculty, must be present at the General Exam.

7. Scheduling of Final Exam (Dissertation Defense)

The Final Exam may be scheduled if:

- a) the General Exam has been passed in a previous academic quarter;
- b) the Reading Committee has read an entire draft of the dissertation; and
- c) the members of the Supervisory Committee agree that the student is prepared to take a Final Exam.

The Request for Final Examination must be submitted via MyGrad (<http://grad.washington.edu/mygrad/student.htm>). At least four members of the Supervisory Committee including the Chair, Graduate School Representative (GSR), and one

other member of the Graduate Faculty, must be present at the exam. If the Final Exam is satisfactory, the Supervisory Committee members will sign the Committee Signature Form and the GPA will submit the Committee's decision to the Graduate School by the last day of the quarter. If the Exam is unsatisfactory, the Committee may recommend to the Dean of the Graduate School that a second exam be administered. The dissertation must be submitted to the Graduate School by the last day of the quarter. If the dissertation is not submitted by the last day of the quarter, the student must pay a Graduate Registration Waiver Fee and submit the dissertation to the Graduate School no later than 14 days after the end of the quarter.

APPENDIX B: SUPERVISORY COMMITTEES

The **Doctoral Supervisory Committee** guides students working toward their graduate degrees at the University of Washington. This committee serves an important evaluative and mentoring function for students throughout their graduate careers. All students are strongly encouraged to view their committee members as a resource, to be consulted about any matter in one-on-one discussions.

The appointment of a Doctoral Supervisory Committee indicates that the faculty finds a student's background and achievement a sufficient basis for admission into a program of doctoral study and research. Formally, students are not admitted directly into a doctoral program upon admission to the UW Graduate School; instead, they become candidates for the doctoral degree upon passing the General Exam, described in detail in [Appendix C](#).

1. Requirements for Serving on the Supervisory Committee

- a. The committee must have a minimum of four members.
- b. At least three (including the Chair and the Graduate School Representative or GSR) must be members of the Graduate Faculty with an endorsement to chair doctoral committees.
- c. A majority of the committee must be members of the Graduate Faculty.
- d. The GSR must be a productive scholar in their own research area that may differ from that of the student's dissertation project.
 - i. GSRs cannot hold faculty appointments in Medicinal Chemistry or have a conflict of interest that would prevent them from providing a fully independent evaluation of the student's performance.
 - ii. Generally, faculty members with primary, joint, adjunct, or affiliate appointments in Medicinal Chemistry are not eligible to serve as GSRs.
- e. The remaining members must be productive scholars in Medicinal Chemistry or related disciplines.

2. Duties of the Supervisory Committee Chair

The Chair of the Supervisory Committee must be able and willing to assume principal responsibility for advising the student. Adequate time must be available for this work, and the Chair must be accessible to the student. Emeritus faculty may serve as Chair if they meet the above conditions. In special circumstances, Co-Chairs may be appointed when two Graduate Faculty members serve with equal importance on the Supervisory Committee and share equal responsibility for the student's progress.

3. Duties of the Graduate School Representative (GSR)

The GSR represents the broad concerns of the UW Graduate School with respect to high standards of scholarly performance, ensuring that your mastery of the subject matter is broad and comprehensive. The GSR is a voting member of the committee and must attest to the validity of the examination, indicate approval of the process by which the examinations was conducted, ensure that the student is treated in an unbiased manner, and represent the UW Graduate School in ensuring university-wide standards of scholarly performance. In preparation for the general and final examination, the GSR should receive all necessary materials (including copies of the dissertation proposal and dissertation) in a timely manner. Changes in the appointment of the GSR are made only under extenuating circumstances.

4. Responsibilities of the Voting Members

Responsibilities of the voting members of the doctoral Supervisory Committee include the approval of a course of study that will fulfill the general course requirements of the Medicinal Chemistry graduate program; conducting the General Examination; and, when appropriate, recommending advancement to Candidacy. The Doctoral Supervisory Committee approves the Candidate's dissertation proposal and guides them in carrying out appropriate research for the dissertation. At least four members of the committee (including the Chair, GSR, and one additional Graduate Faculty member) must be present at both the General and Final Examinations.

The **Reading Committee** is a subset of the Doctoral Supervisory Committee, and should be formed at the same time. The Reading Committee must consist of three Supervisory Committee members, including the Thesis Advisor. It is the responsibility of the Reading Committee to ensure that the dissertation is a significant contribution to knowledge and is a piece of scholarly writing. The Reading Committee must approve the written dissertation following Graduate School procedure after all revisions are complete.

APPENDIX C: GENERAL EXAM

All Graduate Students seeking a Ph.D. degree from the University of Washington must pass a General Examination (“General Exam”), administered by their graduate program. The General Exam should be scheduled as soon as appropriate after the pre-general seminar and no sooner than four months after the Doctoral Supervisory is officially formed; students should aim to have completed the General Exam by the end of Year 3. The exam consists of two parts:

1. Written Description of the Student’s Dissertation Research

Students are required to prepare written proposals ahead of both the pre-general seminar and the General Exam, to gain experience in scientific writing and to succinctly outline the significance and scientific strategy of their proposed dissertation research. Both proposals should resemble an NIH grant application, with a limit of 10 pages (single-spaced, 11 point font) excluding references. It is recommended to structure each proposal as follows:

- **Abstract:** The abstract should be maximum 250 words and describe the background, specific hypotheses and aims, preliminary results and methods used and the experimental plan for the proposed thesis research.
- **Background and Significance:** This part of the proposal should be a 2-3 page, in-depth presentation of the critical background for the research project. It should capture both the broad perspective of the field as well as the detailed evidence available to support the research hypotheses. The background should not include the student’s own experimental results that will become part of the thesis.
- **Specific Aims:** The specific aims should be 1 page in length and clearly state the detailed research hypotheses for the dissertation research. The specific aims should be numbered and state the objectives of the experimental research you conducted. A brief description of how each specific aim will be addressed should be included.
- **Preliminary Data:** This section should be 2–3 pages and organized around the specific aims of the project. For each aim, specific experiments that demonstrate applicability of a selected technique or support the original hypothesis should be presented. The purpose of the preliminary data is to demonstrate that the student has accrued the skills and techniques necessary to complete the dissertation, and to convince the committee that the proposed hypotheses are viable and can be tested. Experimental methods should be described briefly to provide the necessary information required to understand the results. The student should be prepared to answer specific questions pertaining to the design and conduct of these experiments.
- **Experimental Plan:** This section should present in 2–3 pages a relatively detailed plan for the experimental conduct of the dissertation research. It is important that the extent of experiments planned is described for each aim, along with potential pitfalls and alternative approaches, to allow the committee to reach a conclusion of the feasibility and likelihood of success of the proposal.

- **References:** References should be included at the end of the proposal and follow the style used by *Journal of Pharmacology and Experimental Therapeutics*.

The pre-general proposal should be modified in response to faculty feedback and updated to prepare the General Exam proposal, which must then be submitted to the Supervisory Committee at least two weeks in advance.

2. Oral Examination

The examination typically starts with a brief (~5-minute) closed session of the Supervisory Committee. This is followed by an oral presentation by the student describing their proposed dissertation research to the Committee Members.

The prepared presentation should be roughly 30 minutes long, uninterrupted. However, it is expected that Committee Members will interrupt to clarify the significance of the experiments, question specific aims, or ask about technical issues. Students must demonstrate a thorough understanding of the field of research and the concepts and logic underlying their proposal. Students are also expected to display a thorough knowledge of topics covered in the Core curriculum, and be familiar with current literature in areas related to the thesis research. In general, the research presentation serves as a starting point for questions of a broad-ranging nature. The advisor is Chair of the Supervisory Committee but does not play any active role during the examination, normally providing clarification or comment only if asked by members of the committee.

The open portion of the General Exam typically lasts about two hours. It is followed by another brief closed session of the Committee, during which they will arrive at a decision. There are three possible outcomes:

- Pass
- Recommendation to re-examine after corrective action (such as additional coursework, directed reading, or other remedial action)
- Termination in the program, with the possibility of a terminal master's degree

APPENDIX D: TRAINING IN ORAL COMMUNICATION

The Graduate Program provides multiple opportunities for students to practice and develop their oral presentation skills, whether presenting their own findings or critiquing relevant literature.

Students are required to attend and participate in the **Departmental Seminar** (MEDCH 520), jointly administered with the Department of Pharmaceutics. The program will consist of seminars by graduate students in both programs, as well as occasional guest speakers. Students will be graded on a CR/NC basis and are expected to submit peer feedback forms for each speaker.

Students are required to present three times in MEDCH 520:

- **Year 2 – Literature Review**

Students are encouraged to select their own general seminar topics, with the approval of their Thesis Advisor. Ideally, the seminar will cover a topic about which there has been significant recent research activity, of interest to all members of the audience, and not directly related to the student's anticipated research problems or prior experience. This will benefit the student by providing experience in investigating, analyzing, and synthesizing unfamiliar areas of the literature.

The student should prepare a brief (~1 page) written abstract of their seminar, have it approved by their Thesis Advisor, and submit it to the Graduate Program Advisor for dissemination at least three days in advance of their seminar. The abstract should include key references, cited following the *JPET* style or a similar format that includes authors, article title and journal.

This seminar offers faculty an important opportunity to evaluate individual accomplishment in a non-classroom setting. Students are encouraged to practice their talks with peers, senior graduate students, and postdocs. The presentation should last 40–45 minutes, following which ~10 minutes will be devoted to Q&A with the audience.

Students will receive anonymized critiques from their peers in Medicinal Chemistry and Pharmaceutics, and are encouraged to solicit feedback from their Advisor and other faculty members.

- **Year 3 – Pre-General Seminar** (described in [Appendix A.4](#))

- **Year 4 – Research Seminar**

Students are expected to deliver a polished 40–45-minute presentation on their research in progress, updating the audience on new findings and directions that have emerged since the pre-general seminar and General Exam.

All students are expected to actively participate in the **Departmental Journal Club**, “Monday Night Meeting” (MEDCH 582). The format of this course will vary from quarter to quarter. Most often, it will involve an in-depth critique of a selected paper, coordinated by one or two student presenters. Each member of the class is expected to have read the article distributed prior to class and to participate in the discussion. The emphasis is on a free, collegial exchange of ideas, in the form of questions and comments, between students. The main role of the faculty is to facilitate discussion and, when necessary, to correct misconceptions and/or omissions that may arise during the discussion.

In other quarters, Monday Night Meeting may involve grant-writing workshops, or discussions on topics such as peer review, data visualization, literature management, essential statistical concepts etc.

Grading is on a CR/NC basis, and are assigned based on participation and engagement with the material. Crucially, neither the presenter nor the audience members are expected to have all the answers. The objectives of Monday Night Meeting are:

- To promote discussion of impactful literature relevant to research in the Department;
- To inculcate the skills required to organize and communicate complex ideas to an audience of peers;
- To foster an appreciation of optimal experimental design based on critical reading; and
- To develop the skills needed to rigorously and objectively evaluate scientific literature.

Students should master the subject matter or issues raised in MEDCH 582 in preparation for departmental examinations, including the cumulative examination and the General Examination for Ph.D. candidacy, as well as the final thesis defense.