

**Molecular Medicine and Mechanisms of Disease (M3D) PhD Program
Student Handbook
September 26, 2017**

M3D is an interdisciplinary and interdepartmental PhD Program designed for students who seek to pursue careers in translational research via PhD training in basic science. It is distinguished by courses focusing on human biology and disease, by its emphasis on significance of the research project for human health, and by continuous clinical interactions and active participation of the Clinical Mentor in training. M3D explicitly nurtures a dual skillset, enabling students to independently identify important questions in human health and disease and to develop the intellectual and technical skills essential to address these questions.

M3D students have a great variety of interests and goals. Each student will develop a plan (Individual Development Plan; IDP) for training that enables them to achieve their goals most effectively, while becoming broadly educated so that they can take advantage of advances of the future.

The M3D PhD Program is designed to allow students to complete training in five years. The University of Washington (UW) is on the quarter system, and the academic calendar can be found at: <https://www.washington.edu/students/reg/calendar.html>.

In the course of training, students must fulfill specific requirements of the M3D Program and the UW Graduate School. This handbook identifies those requirements, with brief explanations wherever possible, and provides references to UW Graduate School websites with detailed relevant information.

The M3D PhD Program was established in 2014. As a relatively new program, we welcome suggestions for improvements — to this handbook and to the program itself.

1. Requirements for the PhD Degree

- 18 graded course credits, including all courses explicitly required by M3D
- 90 total course credits (graded and non-graded)
- 2 or 3 laboratory rotations
- Proficiency in biostatistics and/or handling large datasets
- Dual mentorship of the PhD candidate by a basic scientist (the Research Mentor) and a clinically active physician, either a physician-scientist or a full-time clinician; (the Clinical Mentor)
- TA for one quarter in a graduate, medical or undergraduate course
- General Examination to be completed by the end of Spring Quarter of Y2
- Capstone Presentation on medical aspects of the research project, in Y4
- One first-author manuscript submitted to a peer-reviewed journal
- Approval of Supervisory Committee
- Successful defense of PhD dissertation

2. Training Timeline

The M3D PhD Program is designed to enable students to complete PhD training in 5 years. UW PhD students are required to complete at least 18 credits of graded coursework. Typically students register for 6-9 credits of coursework per quarter, enabling them to complete the required 18 credits of graded coursework by the end of Spring Quarter of Year 1, prior to joining a thesis research laboratory. Thereafter, students register for thesis research (Path600) each quarter, for which they receive 10 credits per quarter during the three quarters of the academic year and 2 credits in summer quarter.

An outline of the training timeline for a typical M3D student is below:

M3D PhD Program – Schedule Outline	
Year, Quarter	
Year 1, Autumn	Path550: Mechanisms of Disease (3 cr) Path516/MolMed516: Molecular Basis of Human Genetic Disease (3 cr) Path551: Laboratory Rotation Elective(s)
Year 1, Winter	MolMed514: Molecular Medicine (3 cr) MolMed540: Chief of Medicine Rounds (1.5 cr) Path551: Laboratory Rotation Elective(s)
Year 1, Spring	MolMed540: Chief of Medicine Rounds (1.5 cr) Responsible Conduct of Research (RCR) Path551: Laboratory Rotation Elective(s)
Year 1, Summer	Identify Research Mentor Begin Thesis Research
Year 2, Autumn	Identify Clinical Mentor, form Supervisory Committee
Year 2, Autumn or Winter	TA for one quarter
Year 2, Spring	General Examination
Year 4	Capstone Presentation
Year 5	PhD Defense

3. Courses and Course Requirements

A. M3D Requirements

M3D required courses provide a foundation in human physiology, pathology and genetics in didactic courses focused on pathobiology and disease mechanisms (Path550), key problems in diagnosis and treatment of human disease (MolMed514), and human genetics (Path516/MolMed516). Students learn about medical reasoning and become familiar with medical vocabulary by participating in Chief of Medicine Rounds (MolMed540) for two quarters. In addition to the required courses, shown below, students enroll in elective courses relevant to their research interests, choosing from the large menu offered at the UW (see “Elective Courses of Potential Interest” on the M3D website).

M3D PhD Required Core Courses
Path550: Mechanisms of Disease , 3 credits, Drs. Liles and Rendi
This course consists of 10 week-long modules, each system- organ- or disease-based, focused on the renal, cardiovascular, liver/gastrointestinal, lung/respiratory, neural, hematologic and endocrine systems, inflammation, cancer, immunology, and regenerative medicine.
MolMed514: Molecular Medicine , 3 credits, Dr. Liles
This course uses patient case histories to introduce key areas of clinical research and investigative medicine, emphasizing the impact of basic science on medical practice. This course is taught by faculty who are both practicing physicians and clinician investigators, with the goal of facilitating reading of basic science and primary clinical literature, and fostering participation in the many clinical seminars at the UW and affiliated institutions that are focused on human disease problems. Topics covered are in major disease areas including gene- and cell-based therapeutics; inflammation and host response; vascular disease; obesity and weight regulation; cancer biology; and drug development.
Path516/MolMed516: Molecular Basis of Human Genetic Disease , 3 credits, Dr. Byers

This course prepares students for the era of genomic medicine. It is largely a reading and discussion course, focused on diagnosis of genetic disease, molecular mechanisms that cause human genetic disease, and mechanisms by which mutations perturb physiology, with organ-system based examples.

MolMed 540: Chief of Medicine Rounds, 1.5 credit, Dr. Liles

This course builds upon a weekly conference required of Residents in Internal Medicine in which a recent, real-life challenge in treatment or diagnosis of patients on inpatient and outpatient services is presented and discussed by attending physicians and medical residents. Pathologic material, including autopsy findings, are presented whenever available. Following the hour-long conference, Dr. Liles meets with PhD students to explain and discuss terminology and significance.

Laboratory Rotations. Students test the fit of a research topic and laboratory during three quarter-long laboratory rotations. Rotation talks or a rotation poster session are held at the end of each quarter, and attended by all students, rotation mentors, and other program faculty. Students are encouraged to organize a practice session to get feedback from other students prior to the presentations; and following the presentations attendees provide critiques and constructive criticism using a form provided by M3D (see “Presentation Evaluation Form” on the M3D website).

At the end of each rotation, the Rotation Mentor provides an evaluation of student performance to the M3D Program Office, and discusses the evaluation with the student, using a form provided by M3D (see “M3D Rotation Evaluation” on the M3D website). (see “M3D Presentation Evaluation” on the M3D website). Rotations are graded Pass/Fail, and the Rotation Mentor is responsible for submitting this grade following the rotation.

Teaching. Teaching experience is invaluable for careers in academia or industry. Students are required to TA at least one quarter. Teaching opportunities include the M3D core courses, graduate and undergraduate classes. The UW offers half-day workshops on how to teach, and all graduate student TAs are invited to attend one of these workshops prior to beginning to TA.

To maintain eligibility and benefits, students are required to register for at least 10 credits in Autumn, Winter and Spring Quarters, and 2 credits during Summer Quarter.

Each student should verify at the end of each quarter that credits are posted correctly on their online UW Grad School profile, so that if corrections are necessary they can be made in a timely fashion.

B. UW Coursework Requirements

The UW Graduate School requires that students complete at least 18 units of graded course credits to receive a PhD. This required coursework must be completed before a student takes the General Examination. A total of 60 credits (graded and non-graded) must be completed prior to scheduling the General Examination (some of which may be take the same quarter as the exam). A total of 90 credits (graded and non-graded) must be completed prior to scheduling the dissertation defense. Additional information can be found here: <https://www.grad.washington.edu/policies/doctoral/final-exam.shtml>.

Students should also review the Graduate School's Doctoral Degree Requirements (<https://www.grad.washington.edu/policies/doctoral/requirements.shtml>) and Doctoral Degree Policies (<https://www.grad.washington.edu/policies/doctoral/>).

C. UW Student Conduct Code

All students should be familiar with the rules about citation/plagiarism, described from both the student and faculty perspective on the first two links. Note that these rules apply not only to written papers, but also to oral presentations and to slides:

- Plagiarism <https://depts.washington.edu/pswrite/plag.html>

- Center for Teaching and Learning <http://www.washington.edu/teaching/cheating-or-plagiarism/>

We discuss some related issues in the Responsible Conduct of Research (RCR) course.

Other UW websites cover a wide range of faculty and student conduct:

- UW Student Conduct Code <http://www.washington.edu/cssc/student-conduct-overview/student-code-of-conduct/>
- UW Student Conduct Process <http://www.washington.edu/cssc/student-conduct-overview/conduct-process/>
- Faculty Student Conduct Resource Page <http://depts.washington.edu/grading/conduct/>

D. NIH-Mandated Training

Responsible Conduct of Research (RCR) Training

The NIH mandates that first year PhD students receive at least 8 hours of formal training in the Responsible Conduct of Research, some or all of this discussion-based; with a refresher course later in training. M3D students complete this training during Spring Quarter of Year 1, with a refresher four years later. Research Mentors are expected to discuss issues related to responsible conduct of research at least once a year in a formal laboratory meeting.

Quantitative Training

All students must achieve proficiency in statistics/handling large datasets. This may be accomplished by taking a course elsewhere, for example as an undergraduate; online; or here at UW (e.g., CONJ510: Introductory Laboratory-Based Biostatistics); or by demonstrating proficiency developed in the course of research.

Health Insurance Portability and Accountability Act (HIPAA) Training

Almost all students deal with human samples and/or human subjects, and students are required to complete HIPAA training during Autumn Quarter of Year 1. For more information see: <http://depts.washington.edu/comply/compliance-programs/hipaa-program/>.

Individual Development Plan (IDP)

All graduate students and postdoctoral fellows at the UW School of Medicine are required to construct an individual development plan (IDP). The purpose of an IDP is to help students think carefully and concretely about the specific career in science for which he or she is preparing. That career might be at a research university, private research institute, biotech, pharma, federal or state lab; it may involve teaching in 2- or 4-year college or university; performing a variety of roles at a federal granting or regulatory agency; or working as an editor or writer at a journal, magazine or newspaper. M3D students use an IDP template provided by M3D and available on the M3D website. Students first draft an IDP in Fall quarter of Year 1, using a template specific to first year students. Students update it annually thereafter in consultation with the Research Mentor. This 'living document' serves as an editable record of student goals and accomplishments throughout training. IDP's are filed in the M3D office annually, due the last day of instruction in Autumn Quarter.

4. Mentorship

Dual Mentorship

M3D students work with two mentors, a Research Mentor who supervises the research project and a Clinical Mentor who promotes interactions with clinicians and clinical medicine.

Research Mentor. The Research Mentor is the direct supervisor of thesis research, who provides laboratory space and funding, and serves as a primary source of direction and advice. The Research Mentor oversees scientific and professional development, provides ongoing training in responsible conduct of research, and consults with the student on the IDP. The Research Mentor chairs the Supervisory Committee, and in consultation with the candidate, submits a report on student progress after each Supervisory Committee meeting.

Clinical Mentor. The Clinical Mentor promotes and facilitates awareness of the clinical significance of the project. The Clinical Mentor may be either a physician-scientist or a full-time clinician, but must be active in the clinic, regularly seeing patients in some capacity. The Clinical Mentor attends Supervisory Committee meetings, attends Capstone presentations and is available for informal discussions. A Clinical Mentor may provide a student with access to the clinic, by enabling a student to “shadow” the mentor when meeting with patients. In some cases, a Clinical Mentor may provide access to clinical samples or involve a student in writing an IRB application.

Identification of the Clinical Mentor

Students must identify a Clinical Mentor during Autumn Quarter of Year 2, shortly after they begin thesis research. M3D Co-Director, Conrad Liles, works with each student to help identify a Clinical Mentor with expertise most appropriate to the student’s interests and research.

Supervisory Committee

Each student is overseen by a Doctoral Supervisory Committee, which monitors student progress and submits a formal report to the M3D Program at least once a year. The Supervisory Committee is chaired by the Research Mentor. It includes the Clinical Mentor, the “Graduate School Representative” (GSR), and three or four other faculty working in relevant research areas. The roles and responsibilities of this committee are detailed at: <https://grad.uw.edu/policies-procedures/doctoral-degree-policies/doctoral-supervisory-committee-roles-and-responsibilities/>.

The Graduate School Representative (GSR). The role of the GSR is to provide an impartial perspective on expectations and student progress, and ensure that these are consistent with institutional policies and precedents. The GSR need not be closely acquainted with the specific research area, but the GSR must be able to serve as the go-to person if there are any issues that the student and mentor cannot readily resolve. Thus students are encouraged to choose as GSR someone with whom they are comfortable and who they perceive as fair-minded. It is frequently useful if the GSR has had experience with PhD training, for example by having supervised students in his/her own laboratory. The GSR must be free from any conflict of interest with the Research Mentor or the student, and may not have a primary, joint, or affiliate appointment in a stakeholder department, nor in that of the Research Mentor (if from a non-stakeholder department); or any recent budgetary, personal, research and/or publication relationships with the student or the Research Mentor.

Monitoring student progress

Progress is monitored in three areas: bench research, intellectual growth as measured by attendance and participation at seminars and courses; and clinical awareness, as measured by growth in understanding of the relation of the project to human health and disease.

Students meet with the Supervisory Committee at least once a year during Years 2-4, and thereafter twice a year until the Thesis Defense is approved and scheduled. The meetings in Year 3 and thereafter must occur no later than the end of Winter Quarter.

At least three days prior to each Supervisory Committee meeting, the student must provide all committee members and the M3D office with a written report that documents the student’s progress toward the PhD degree. The report describes the focus of the research project and its significance for human health, and it summarizes research progress made since the previous Supervisory Committee

meeting. The report should be 3-5 pages long (single-spaced), and it should include text, figures, tables and references, if relevant.

The Supervisory Committee meeting begins with a slide that summarizes the M3D PhD Program requirements that have been completed thus far:

- Course requirements
- Statistics
- TA'ing
- Course credits (graded and non-graded)

It moves to a discussion of research progress and plans, and ends with a discussion of the student's IDP. At the conclusion of each meeting, the committee should provide clear expectations for progress in the period prior to the next meeting.

Progress Reports

Two written reports on progress must be submitted to the M3D office within one week after each committee meeting, one by the Research Mentor and one by the student.

Research Mentor's Report: The Research Mentor's report should state the focus of thesis research, and whether this focus has changed significantly since the last meeting; and briefly summarize the student's progress. The report should identify strengths and areas in which there is need for improvement, such as mastery of the literature, oral presentation skills, or time at the bench. This report should include a list of action items to be accomplished prior to the next meeting. The report must explicitly state whether the student has or has not met expectations as previously outlined. If not, a clear timeline must be established for progress over the next 6 months, and a formal meeting of the Supervisory Committee scheduled for the end of that 6-month period. The report is co-signed by the student and Research Mentor. The Research Mentor is responsible for distributing the final, signed report to the student, all committee members, and the M3D Program Office (m3d@uw.edu), where it will be maintained in the student file.

Student's Report: The student should write a short report (one paragraph) reflecting on what has been accomplished, what strengths can be built on, and where there are opportunities for improvement.

5. General Examination and Advancement to Candidacy

The UW requires that PhD students pass a General Examination for admission to candidacy. The exam can only take place after a student has acquired the 18 graded units of course credit and 60 credits overall (graded and ungraded), as required by the UW Graduate School and detailed at: <https://grad.uw.edu/policies-procedures/doctoral-degree-policies/general-examination-admission-to-candidacy-for-doctoral-degree/>.

The goal of the General Examination is to establish that a student has reached a level of intellectual independence and technical sophistication sufficient to proceed with thesis research. To demonstrate proficiency, M3D students must write, present and defend a 6 page (single-spaced) R21 grant-style proposal on the thesis research to at least four members of the Supervisory Committee, including the Research Mentor and the GSR. The final format and length of the written grant will be discussed at the pre-general exam supervisory committee meeting. To ensure fairness and consistency of standards, at least two of those Committee members must have successfully graduated two or more PhD students from their own laboratories.

The proposal must explicitly state the central goal of the research, and make a strong case for the significance and impact of the project for human health and disease. The proposal must include two or three specific aims, with clear descriptions of experimental approaches to address each aim. The

proposal must also include a realistic timeline illustrating how experimental work will be completed no later than the end of winter quarter of Year 5 of graduate studies.

Ground rules for the examination:

- The exam is to be no more than 3 hours in length.
- It may include a brief break.
- It begins with an oral presentation by the student on background, significance, recent results, and specific experimental plans. The oral presentation should be planned for approximately 45 minutes, but it may extend beyond this time based on the number of questions asked by committee members.
- Examiners may interrupt the oral presentation with questions at any time.

The General Examination is administered by the members of the Supervisory Committee. The Research Mentor attends the exam but may not ask the student questions. At the beginning of the examination, a General Exam Chair will be appointed from among the Supervisory Committee members.

The General Exam Chair has the following responsibilities:

- To review the ground rules.
- To ensure that questions are fair and on-topic.
- To keep the examination moving at an appropriate pace.
- If the student passes, to obtain faculty signatures on the warrant recommending advancement to candidacy. (The student must bring this warrant to the Exam.)
- To provide a written report on student performance in the examination to the M3D office within 3 days of the exam, and to file relevant paperwork with the Graduate School within 7 days of the exam.

The student has the following responsibilities after the General Exam:

- To provide a copy of the examination to the M3D Program Office.
- To write a short report (one paragraph) for submission to the M3D Program Office reflecting on what has been learned in preparing for this exam and from the committee's questions, with emphasis on identifying opportunities for improvement.

The M3D PhD Program requires completion of the General Examination by the end of Year 2, to maximize time for focus at the bench. If student performance on the examination is unsatisfactory, the Committee may recommend rewriting all or a portion of the proposal, and/or re-examination, with a maximum of two re-examinations allowed. Re-writing and/or re-examination must be completed by the end of Winter Quarter, Y3, except in unusual circumstances that will require a written waiver from the Program Director and Co-Directors.

6. Research Presentations

Mini-Symposia

To help students develop skills and confidence in discussing their research in front of a critical audience, M3D holds Mini-Symposia at which students present half-hour talks focused on their research in progress.

Capstone Presentation

At the Capstone Presentation, in Year 4, a student presents a half-hour talk focused on the significance and potential translational impact of the thesis research project, to an audience composed of other M3D students and Research and Clinical Mentors.

Thesis Defense

Each student presents an hour long seminar describing the rationale, results and significance of the thesis research. The Thesis Defense is attended by the Supervisory Committee as well as a larger audience of faculty and students.

7. PhD Dissertation Requirements

To receive the PhD degree, a student must complete the required 90 course credits (graded and non-graded); publish (or submit for publication) at least one first-author paper to a peer-reviewed journal; and submit a written thesis and defend it at a formal Thesis Defense seminar, advertised throughout the UW and M3D-affiliated institutions, and attended by all members of the Supervisory Committee and M3D Program faculty and students. Following the defense, the Supervisory Committee poses additional questions, and then each member verifies that the student merits award of the PhD degree.

Students should review the Graduate School's Final Examination policies:

<https://grad.uw.edu/policies-procedures/doctoral-degree-policies/final-examination-dissertation-defense/>

The written thesis must be read and approved by a Reading Committee of faculty who approve the thesis on a standardized form: : <https://grad.uw.edu/wordpress/wp-content/uploads/phd-approval-form.pdf>.

The written thesis must be submitted in compliance with UW Grad School policies:

<https://grad.uw.edu/for-students-and-post-docs/thesisdissertation/>.

Compliance with Milestones and Deadlines

Students are expected to comply with milestones and deadlines as specified above. A student may, under special circumstances, be unable to meet a milestone or deadline in a timely fashion. In that case, the student must submit in writing to the M3D Program Office a request for a change in deadline. To ensure fairness, if a student working in the laboratory of the Director or one of the Co-Directors submits an appeal, a different faculty member identified by the M3D Steering Committee will deal with that appeal.

8. Student Support

The M3D Program provides the following financial support to students for the first 3 quarters of the first year of training:

- Stipend
- Health Benefits
- Tuition Support

Once a student joins a Research Mentor's laboratory, that student is no longer supported by the M3D PhD Program, but by the Research Mentor's funds or by a training grant.

Related information can be found at:

Graduate Appointee Insurance Program (GAIP, details on insurance):

<http://www.washington.edu/admin/hr/benefits/insure/gaip/index.html>.

Graduate Funding Information Service (GFIS, a guide to external funding resources):

<http://guides.lib.uw.edu/friendly.php?s=research/gfis>.

UW Graduate Student Union Contract:

<http://www.washington.edu/admin/hr/laborrel/contracts/uaw/contract/index.html>.

Consideration of Support in Identification of Rotation Mentors and Research Mentors

The M3D PhD Program is an interdepartmental program supported by a consortium of “stakeholder” departments and institutions. M3D PhD Program students are free to pursue laboratory rotations or PhD training with faculty with primary or joint appointments in those stakeholder departments and institutions. Students may pursue laboratory rotations or PhD training with a mentor in a non-stakeholder department or institution only with a Reimbursement Agreement in place. This is a written agreement in which the faculty members states that, if the student joins his/her laboratory, the faculty member will reimburse the M3D Program for costs associated with student recruitment, first year support, and administrative costs incurred during the second year of training and thereafter. The Reimbursement Agreement must be co-signed by the mentor, the administrator or director of the mentor’s institution/department, and the Department of Pathology Director of Finance and Administration. A student may not begin research until the Reimbursement Agreement is on file. Please contact the Program office for more information.

9. Student Responsibilities and Expectations

M3D students benefit from a vibrant intellectual community. Students are expected to contribute to this community by attending program events, including presentations by fellow-students and by M3D faculty at Retreats, Rotation Presentations, Mini-Symposia, Capstones, and Thesis Defenses.

M3D students are expected to comply with deadlines specified for coursework, grant renewals, grant applications, administrative requests, etc.

To maintain eligibility and benefits, students are required to register for at least 10 credits in Autumn, Winter and Spring Quarters, and 2 credits during Summer Quarter. Each student is responsible for verifying credits for each quarter as reported in their UW Graduate School online profile.