Pharmacology and Molecular Medicine Program

SCHOOL OF MEDICINE

UNIVERSITY OF COLORADO
ANSCHUTZ MEDICAL CAMPUS

STUDENT HANDBOOK

Last updated: August 2025

PharMM Website

Information in this handbook is subject to change at any time without prior notice

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Program Guidelines Disclaimer

As a member of the Pharmacology and Molecular Medicine PhD Program, you are expected to adhere to all established policies and procedures of the University, the Office of Research Edcuation, the Graduate School and this PhD Program.

CU Anschutz – University Policies	https://catalog.ucdenver.edu/cu-anschutz/university-policies/
Office of Research Education	https://medschool.cuanschutz.edu/ore/forms-and-resources
Graduate School	https://graduateschool.cuanschutz.edu/forms-resources/resources

For any policies, please make sure to review the Graduate School Policies and Procedures.

Program Overview

Our mission is to train the next generation of scientists and leaders in the field of Pharmacology and Molecular Medicine. Students receive expert training from nationally and internationally renowned Program faculty to interrogate the molecular mechanisms of biological systems and disease and to leverage discoveries for therapeutic intervention in the areas of neuroscience, cancer biology, signal transduction, structural biology, cardiovascular biology, precision medicine, and computational biology. Graduates have been highly successful in academic, biotechnology, and government careers.

Office of Research Education Contacts

Program Co- Director: Jim Costello, PhD
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Office of Research Education (located in the Fitzsimons Building, 5th Floor West, Suite W5107)

Angie Ribera: Associate Dean of Research Education, angie.ribera@cuanschutz.edu

- Point of contact for faculty, program, and organizational concerns and planning

Jodi Cropper: Business Services Program Director, jodi.cropper@cuanschutz.edu

- Point of contact for financial and organizational planning concerns and coordination

Morgan Texeira: Program Manager, morgan.texeira@cuanschutz.edu

- Point of contact for program specific concerns and additional point of contact for Program Administrators

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- Point of contact for ORE administrative concerns, organizational planning and ORE leadership availability

BSP & MSTP Requirements

Students transferring to PharMM from the Biomedical Sciences (BSP) or Medical Scientist Training (MSTP) programs may have different credit/course requirements (see appendix 1). Applications for transfer will be evaluated based on thesis lab availability, transcripts, and performance on the preliminary exam and in rotation labs. It is important to understand that transfer from either program into the PharMM depends on a PharMM faculty member agreeing to accept the student into their lab for the student's thesis work.

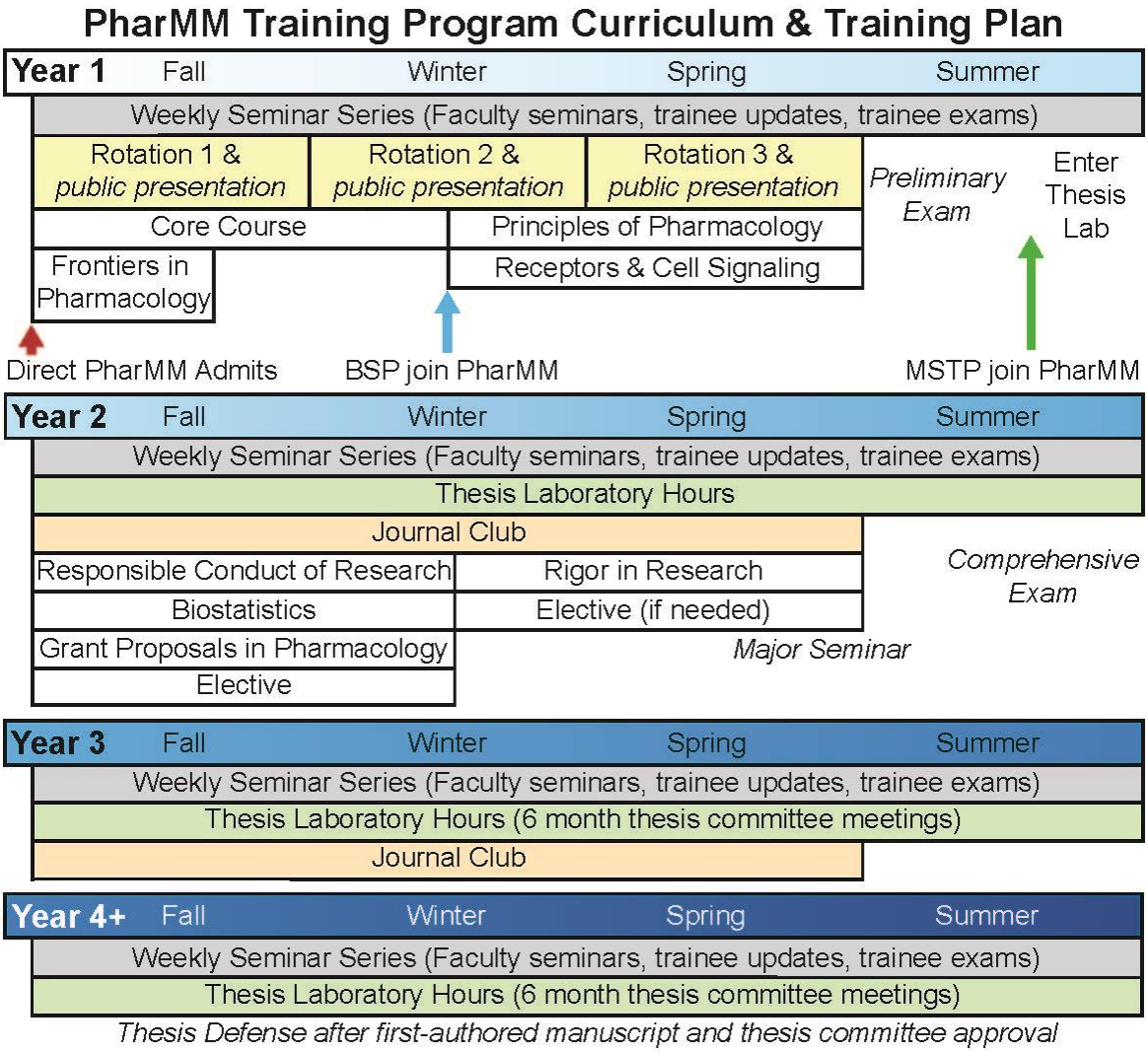
MSTP Students should enter a thesis lab with 27-33 graduate credits, including graduate core. They have also completed/will complete the MSTP Preliminary Course focused on grant writing in Spring term of their transfer year. This course covers F31 grants, but also F30 grants which are specific to dual-degree trainees. The MSTP administration will review student transcripts with the PhD Program Administrator at the time of transfer and will confirm that all expected graduate credits have been posted for program review and evaluation.

MSTP students have already selected and been accepted into a thesis lab within the selected PhD program. They will enter the program under this lab's support immediately upon transfer and should not incur charges to the PhD program at any point in training absent the need for gap funding/support. As such, please consider this transfer to be equivalent to a second-year PhD student. Time to degree is a very important metric for the NIH and the program's T32 grant. MSTPs are expected to complete their PhD training within four years of entering a lab. Of course, mitigating circumstances can occur. The MSTP Administration should be alerted to any significant progress concerns which may impact a student's ability to graduate within the expected time frame. This can be accomplished by meeting, email, or committee meeting notes as appropriate.

- MSTP students should contact MSTP Administration to obtain the program specific lab mentor agreement to review lab mentor responsibilities, curriculum requirements and other expectations related to the research portion of training. **MSTP students must have thesis committee meetings every 6 months** regardless of their PhD program. Each MSTP student's thesis committee should have a faculty member representing MSTP. Students should discuss MSTP faculty representation with the Director or Associate Program Director to identify suitable candidates.
- Throughout the Thesis stage of training, MSTPs are required to register for the *Longitudinal Foundations of Doctoring* (FOD) course in 2 terms annually (Fall and Spring). They will enroll into the *Capstone Return-to-Clinics* course in their last year of thesis training, replacing FOD in the spring

term. The MSTP mentor is responsible for covering the costs for these courses and agrees to this as part of the MSTP-specific mentor letter.

Curriculum Overview



Registration Process

- Academic Calendars (see The Graduate School calendar)
- Course Catalog (See Pharmacology and Biomedical Basic Science for relevant course descriptions)
- Register for Classes (see The Graduate School)
    - All basic science PhD students must register for a minimum of 5 credits (fall and spring semesters), 1 credit of 8990 (summer semester). Any credit hours above the minimum credit level will need approval from your faculty mentor.
    - First year students, BSP and MSTP students should work with their Program Director(s), Program Administrator, and faculty mentor(s) as there will be additional credit requirements associated with their progress in the program.

- Payment of tuition, fees, and student health insurance occurs the week following the deadline for the semester add/drop period, which can be found on the academic calendar . The Program Administrator will complete the process of submitting the appropriate form to the Bursar's Office. For those students receiving financial aid, please work with the Program Administrator to avoid any disruption in awarding financial aid.

Year 1 Requirements

Fall Semester: Required Courses		
Course Title	**Registration Information**	**Credits**
Foundations in Biomedical Science	BMSC 7806	6
Core Topics in Biomedical Sciences – A (student may select topic)	BMSC 7810	2
Core Topics in Biomedical Sciences – B (student may select topic)	BMSC 7810	2
Frontiers in Pharmacology	PHCL 7600	1
Research in Pharmacology - Rotation 1	PHCL 7650 (001)	1
Research in Pharmacology - Rotation 2	PHCL 7650 (002)	1
Spring Semester: Required Courses		
Course Title	**Registration Information**	**Credits**
Principles of Pharmacology	PHCL 7620	6
Receptors and Cell Signaling	PHCL 7606	3
Research in Pharmacology - Rotation 3	PHCL 7650 (001)	1
Summer Semester: Required Courses		
Course Title	**Registration Information**	**Credits**
Doctoral Thesis	PHCL 8990	1

- **Rotations and Rotation Seminar**

  Students are required to complete three lab rotations in their first year. At least 1 week before the start of each rotation, students are required to submit the PharMM Pre-Rotation Form with their mentor's name for approval from the Program Directors to proceed with the mentor selected.

  For each rotation, students are required to submit the ORE Milestone Rotation Form no later than 1 week after the start of the rotation. The Program will communicate instructions and submission deadlines.

At the end of each rotation, students give a seminar to develop public presentation skills—key for career success. Students are expected to rehearse with their lab and junior students in the program. Practice talks with PharMM students will be organized by the Student Life committee. See appendix 3 for further details on rotations.

- The goal of the rotation is to find your thesis research lab and mentor. This includes, but is not limited to, assessing the research of the lab, mentorship style, work ethos of the lab, roles and responsibilities, communication style, and expectations. Simultaneously, rotations are a way for the lab and the rotation mentor to evaluate your readiness, your ability to balance all of your responsibilities, your ambition, your alignment with the lab ethos, and your work ethic. Even if the lab has funding to support a graduate student, the rotation mentor has no obligation to take a student into the lab. It is your responsibility to weigh the pros and cons of any given lab and to inquire about the possibility of joining a lab for your thesis work.
- If you do not find a thesis lab after three rotations, a fourth rotation may be requested. If you need a **Fourth Rotation (with Program Director approval),** you must request approval from your Program Director(s), and it is your responsibility to find a fourth rotation mentor. The fourth rotation mentor must speak directly with the Program Director(s) to evaluate funding, scientific goals, and the likelihood of success. If the fourth rotation mentor is determined to be suitable, the Graduate Training Committee will review and approve/deny the request. If the Graduate Training Committee approves the fourth rotation, the Program Administrator and Program Director(s) will work with the Office of Research Education accordingly. Fourth rotations are not guaranteed. Fourth rotations must start on or before July 1 of that year with Program Director(s), Graduate Training Committee, and ORE approval. The fourth rotation is not typical. Open and transparent dialogue between the student and Program Director(s) is expected.

- **Graduate Training Committee Meetings**

  Within the first few weeks, new students will receive a schedule to meet with each of the members of the Graduate Training Committee (GTC). These meetings are designed to help students adjust to the training program, to provide an opportunity to express any concerns or difficulties that they might experience and to allow students to ask any questions that they might have. **These meetings are mandatory**. If a reason to miss the meeting arises, the student will notify the GTC member before the scheduled meeting and request to reschedule the meeting. After meeting with all of the members of the GTC, each student will choose a member of the committee to act as his or her interim advisor. The selected GTC member will serve as the new student's advisor through the completion of the Preliminary Examination.

- **Preliminary Exam** – Mid June

  The Preliminary Examination is a broad-based, two-day written examination covering the didactic material presented during the first-year course work.
  - Students are required to have a passing grade of a B or higher in the following course to be eligible to take the Preliminary exam (a grade of a B- or below is considered a non-passing grade)
    - PHCL 7620 - Principles of Pharmacology

- PHCL 7606 - Receptors and Cell Signaling

- **Transfer to Thesis Lab**
  Students should reflect on their rotation experiences and discuss lab choices with rotation mentors and their first year advisor. Students transfer to their thesis labs on July 1st. The Program Director(s) and the Program Administrator should be notified of the choice of mentor on or before June 1st, except in the case of a 4th rotation. See appendix 3 for information on 4th rotations. After the thesis lab is chosen, the Program Administrator will route the **Predoc Financial Support Agreement** for signatures.

- **Residency**
  Per University policy, it is required that students begin the process of establishing their residency as soon as they accept their offer to join the PhD program. This process must be started promptly to ensure you meet the necessary deadlines by the end of your first year. For more information, please visit the University website – **Residency** . **Students who do not obtain Colorado Resident Status as defined by the Registrar (with the exception of international students) will be expected to pay the difference between in-state and out-of-state tuition beginning the Fall of year 2.**

Year 2 Requirements

- Minimum registration requirement for full-time graduate students is 5 credits. **Anything above 5 credits must be approved by faculty mentor.** If a student registers for more than 5 credits and the thesis advisor does not approve, the student is responsible for the cost of the credits above 5 credits.

Fall Semester: Required Courses		
Course Title	**Registration Information**	**Credits**
Statistics for Basic Sciences	BMSC 7820	1-5 (variable)
Responsible Conduct of Research	BMSC 7811	1
Elective (min. 2 cr; either Fall or Spring – Consult with Mentor)	*Based on topic selected	2-3 (variable)
Journal Club	PHCL 7613	1
Optional: Grant Proposals in Pharmacology	*PHCL 7615*	*1*
Doctoral Thesis	PHCL 8990	1
Spring Semester: Required Courses		
Course Title	**Registration Information**	**Credits**
Rigor and Reproducibility	BMSC 7812	1
Elective (min. 2 cr; If not taken in the Fall – Consult with Mentor)	*Based on topic selected	2-3 (variable)
Journal Club	PHCL 7613	1
Doctoral Thesis	PHCL 8990	1-2 (variable)
Summer Semester: Required Courses		

Course Title	Registration Information	Credits
Doctoral Thesis	PHCL 8990	1

- **Seminars & Research Update Talks**
  - 2nd year students are required to attend in-person seminars
  - Seminars are Mondays, 12 – 1 pm

- **Major Seminar: T**he Major Seminar is designed both to give the student an opportunity to explore in greater depth areas covered in the didactic curriculum, and to provide experience in the presentation of a thirty-minute seminar in preparation for the Comprehensive Exam. Dates in April/May will be assigned to each second-year student. Details of the Major Seminar can be found in Appendix 4.

- **Comprehensive Exam:** Students must schedule the comprehensive exam before Labor Day of Year 3 in the program. An earlier date can be identified depending on the student's preparedness to take and defend the comprehensive exam document.
  - **Required forms** to be completed using DocuSign. These forms must be submitted to the Program administrator at least 4 weeks prior to the exam date.
    - Application for Candidacy form
    - Exam Request form
  - Once a date has been set with your Comprehensive Exam Committee, you must contact your Program Administrator to initiate forms.

Year 3+ Requirements

- Minimum registration requirement for full-time graduate students is 5 credits. Anything above 5 credits must be approved by your faculty mentor.
- Students defending in the current semester must register for 5 credits of PHCL 8990. If a student is defending between semester dates as defined by the Academic Calendar, the student must register for 5 credits of PHCL 8990, in the proceeding semester of the scheduled defense date.

Fall Semester: Required Courses		
Course Title	**Registration Information**	**Credits**
Doctoral Thesis	PHCL 8990	4-5 (variable)
Journal Club (Required for 3rd year students ONLY)	PHCL 7613	1
Spring Semester: Required Courses		
Course Title	**Registration Information**	**Credits**
Doctoral Thesis	PHCL 8990	4-5 (variable)
Journal Club (Required for 3rd year students ONLY)	PHCL 7613	1

Summer Semester: Required Courses		
Course Title	**Registration Information**	**Credits**
Doctoral Thesis	PHCL 8990	1

- **Seminar & Research Update Talks**
  - 3rd year and beyond students are expected to attend in-person PharMM and Pharmacology Department seminars
  - Post-Comps Students must give a Thesis Update Talk during the PharMM and Pharmacology Department seminar series once per year
  - Seminars are Mondays, 12 - 1 pm

- **Thesis Committee Meetings:** Students are required to have a thesis committee meeting every 6 months.

- **Thesis Defense:** Students typically defend in years 4+. Please see the Examinations Section for more information. Approval to set a thesis defense date must be given by the student's Thesis Advisory Committee at a Thesis Advisory Committee meeting.

Examinations and Evaluations

Preliminary Exam

1st year students take the Preliminary Qualifying Exam at the end of the first year of graduate school. BSP students that plan to join **PharMM** will participate in the program's preliminary exam.

- Students are required to have a passing grade of a B or higher in the following courses to be eligible to take the Preliminary exam (a grade of a B- or below is considered a non-passing grade):
  - PHCL 7620 - Principles of Pharmacology
  - PHCL 7606 - Receptors and Cell Signaling
  - The Program Director(s) will be in contact with the course directors to assess student performance. If there are concerns, the best course of action is to work with the course directors and Program Director(s) to address the concerns. If the student does receive a B- or below in either or both of the courses, they will not be eligible to take the Preliminary exam and must either take corrective actions, which must be determined by the Program Director(s). Failure to take corrective actions is grounds for dismissal from the program.

- **Format of Preliminary Exam:** The Preliminary Examination is a broad, two day written examination covering the didactic material presented during the first-year coursework. The exact format of the examination, time, and number of questions may change on an annual basis. For students matriculating into PharMM, a major focus of the examination will be on material presented in the PharMM required courses (Principles of Pharmacology and Receptors and Cell Signaling).

- **Policies for MSTP Students:** PharMM will honor the results of the MSTP specific Preliminary Exam.

Comprehensive Exam

At the beginning of the second year of study, PharMM students will begin preparing for the Comprehensive Exam. It is highly recommended that students familiarize themselves with the Comprehensive Exam policies and deadlines and discuss forms and timelines with the Program Administrator well ahead of the planned examination so all required paperwork can be completed on time. A student must be registered at the time they take the Comprehensive Exam.

- For reference, appendix 12 contains a detailed timeline and checklist for required tasks.
- **Requirements of the Comprehensive Exam**:
  - Students are required to take the Comprehensive Examination for admission to candidacy for the Pharmacology and Molecular Medicine Ph.D. before the end of their second year (end of first lab year) for MSTP students).
  - All students who take the Comprehensive Exam must have passed a Preliminary Exam.
  - At the time of taking the Comprehensive Exam, students must have taken or be enrolled to take 30 graded didactic course credits.
  - Students who have joined PharMM directly must also have passed all required coursework from Year 1.
- **Formation PharMM Comprehensive Committee:**
  - The Comprehensive Exam Committee shall consist of a minimum of five Graduate Faculty members.
    - The majority of the members, including the chair, must be from the PharMM Training Faculty.
    - At least one committee member must be a sitting member of the GTC.
    - Exam Committees may include faculty member(s) from outside the Program's training faculty (but no more than two).
    - The student's thesis mentor is not a member of the examination committee.
  - Selection of committee members should be done in late Fall or early Spring of the second year.
    - The student should discuss with his/her thesis advisor an appropriate group of faculty, then contact the faculty members to determine their interest. Often faculty like to meet with the student to discuss the project before committing to being on the committee.
    - Once a student has a group of interested faculty, they should submit the faculty list to the Program Director(s) for approval. The Program Director(s) and the GTC must approve the composition of the Comprehensive Exam committee before scheduling the examination.
  - As you prepare for your Comprehensive Exam, please ensure that all your committee members have a faculty appointment listed in the Graduate School Faculty Directory.
  - To promote the timely career progression in graduate school, PharMM trainees must complete their comprehensive examination *before* Labor Day of their 3rd year. Any exam scheduled after Labor Day must be approved by the Program Director(s).

- **Required Forms to Schedule Comprehensive Exam:**
  - Graduate School - Resources & Forms - CU Anschutz
    - App Candidacy form

        - Exam request form
    - Once a date has been set with your Advisory Committee, you must contact your Program Administrator to initiate forms. You will also discuss room bookings at this time. All forms must be submitted to the Administrator at least a month prior to the exam date.

- **Format of the Comprehensive Exam:**
  Students must demonstrate deep scientific understanding and defend their proposal. The exam tests broad knowledge beyond coursework. Students may consult committee members beforehand about expected subject areas.
    - The student prepares (with little or no assistance from the mentor; NIH form for student/mentor respective contribution must be included) the full proposal (up to 8 single-spaced pages) complete with Specific Aims, Background/Significance, Preliminary Data and Experimental Plan sections. The proposal should also include a reference section (see NIH guidelines) that does not count towards the 8-page limit. The proposal should be sent to the committee for final review a minimum of two weeks prior to the exam date.
        - Approximately **8 weeks** before the Comprehensive Exam, the student prepares a 1-page document including a description of the problem, hypothesis, and specific aims similar to the "Specific Aims" page of an NIH F30/31 grant application. This is submitted to members of the Comprehensive Exam committee (by email).
        - Within 2 weeks of receipt of this 1-page document, the committee members may provide comments, either in writing or in person, to the student to provide feedback about the significance of the problem, the focus the hypothesis, and the strengths/weaknesses of the Specific Aims. A majority (4 of 5) of the members must approve, and the direct approval from the committee chair must be given for the student to proceed in writing their full proposal. If a majority of the committee members feel that the Experimental Problem/Hypothesis/Aims are seriously deficient, an additional round of critique/response may be considered. It is recommended that the student reach out to each committee member to set up a 15-30 minute meeting to get direct feedback.

    - PharMM has three major components to the Comprehensive Examination:
        - Written grant proposal
            - The proposal should follow standard NIH format including:
                - Introduction with hypothesis-driven specific aims
                - Background and significance
                - Preliminary data (either from student experiment, thesis laboratory, or literature)
                - Method of approach to each aim including sections on
                    - rationale
                    - experimental design
                    - possible outcomes and their interpretation(s)
                    - the specific protocol or protocols, with appropriate attention to methodological detail and controls
                    - limitations or pitfalls

        - Respective Contributions Statement signed by student and PI (see below)
        - **NEW:** **Statement on Data Reproducibility and Rigor**
- Respective Contributions (from the Ruth L. Kirschstein National Research Service Award Individual Fellowship Application (PHS 416-1), section 1, p. I-27)
    - Describe the collaborative process between you and your sponsor/co-sponsor in the development, review, and editing of this research training plan. Do not include the respective roles in accomplishing the proposed research.
    - In this description, the following statement should be included, "I have written the research plan independently from my thesis mentor."
- The proposal should be no more than 8 single-spaced typewritten pages (NIH guidelines allow 0.5 inch margins on all sides; font should be Arial or Helvetica and no smaller than 11 point), exclusive of citations. The time frame involved should be such that the work could be completed in two to three years (similar in nature to pre-doctoral or post-doctoral fellowship grants, i.e., PhRMA, NRSA, AHA). It is expected that the student will have read other grant proposals made available to them and will be acquainted, in general, with the appropriate format of proposals.
- It is likely that the student will spend a significant period of time acquainting themself with the primary literature related to the topic and be able to summarize succinctly its relevance to their own proposal.
- The student should expect to build a rationale for the project, and to justify the hypotheses to be tested based upon relevant biological processes.
- The faculty generally assumes that the topic of the proposal is related to or is, in fact, the student's thesis project; therefore, it is expected that the proposal be the product of the student, not the mentor. It is not appropriate for a student to "cut and paste" from the mentor's R01, or other grants or papers in order to obtain a basis for his or her own grant proposals. Conversely, it is not expected that the student will work in a vacuum, as they obviously will have discussed ideas, aims, and approaches toward aims with mentors. Regardless, it is not appropriate for other individuals, particularly the mentor, to have "edited" the student's proposal. The faculty employ an honor system regarding this examination requirement; please abide by it. A copy of the Respective Contributions Statement, outlining the respective contributions of the student and the mentor and signed by both will accompany each exam submission. In short, the faculty intend that the student compose and present a unique, independent, defensible proposal.
- Comprehensive exam presentation
    - A 30–45-minute seminar open to the public
        - Formal summary of the candidate's proposal.
            - This presentation also provides an opportunity for the candidate to clarify any changes in thinking between submission of the proposal and the actual defense.
    - Audience Q&A
- Closed door, oral defense of the proposal
    - With the student out of the room:

- The thesis advisor will provide the Exam Committee with his/her assessment of the student's progress to date.
- The Exam Committee chair will also summarize the student's academic progress to date (obtained from the student's file) and also present to the rest of the committee the different criteria on which the evaluation of the student will be based (see Evaluation Criteria below).

- With the student in the room:
  - For a period lasting 1.5-2 hours, faculty on the Exam Committee will ask the student questions.
- With the student out of the room:
  - The committee will then explicitly discuss each of the criteria, apply a rating in each area, and then decide whether to give the student an overall score of Pass, Pass with Conditions, or Fail.
  - All Committee members will sign the DocuSign form, indicating the result of the exam.

➢ **Grading the Comprehensive Exam:**
The exam is graded Pass/Pass-with-Conditions/Fail. With the Pass-with-Conditions grade, the Exam Committee outlines remedial actions to be taken by the student and a timeline. The Exam Committee also completes an evaluation of the student's performance. Within this report, the Committee scores the student in a variety of different areas, including knowledge of concepts and the quality of the oral presentation. The Committee typically also provides constructive scientific feedback on the proposed project.

Thesis Defense

➢ **Thesis Committee Formation:**
- Students must establish a committee with a minimum of 3 PharMM Faculty members, including the faculty mentor (cannot be thesis chair).
- Please ensure that all your committee members have a faculty appointment listed in the Graduate School Faculty Directory.

➢ **Timing and requirements of the Thesis Defense**:
- Students must have at least one first-author or co-first author research publication *accepted* in a peer-reviewed journal based on the student's thesis work before their defense.
- At the time of the defense, the student must have taken or be registered for at least 30 PHCL 8990 course credits.
- If defending after the semester ends you must register for 5 credits of 8990 in the proceeding semester. (Thesis defenses must be tied to the end of the semester deadlines dates).
- Students should schedule a defense date at least 6 weeks in advance of the anticipated date.
- Students are generally required to submit their final thesis to the Thesis Committee at least two weeks prior to the defense date.
- A student must receive approval from the thesis committee prior to moving forward to schedule a defense date.

        - The thesis committee has discretion to determine what students must provide, and when, prior to giving approval.
    - All Ph.D. dissertations must include a 1-page "Statement on Data Reproducibility and Rigor". General guidance may be found at: http://grants.nih.gov/reproducibility/index.htm

- **Thesis Defense**
    - The thesis defense consists of:
        - ~50-minute oral presentation by the student
        - A 1-2-hour closed-door meeting with the Thesis Committee.
    - The closed-door defense begins with the Thesis Committee Chair outlining the goals and mechanics of the meeting.
        - Typically, the meeting consists of faculty taking turns asking questions.
        - Based on the written thesis document, the oral presentation, along with interactions at the defense, the Thesis Committee will assign a score of Pass, Pass with Conditions, or Fail to the defense.
    - Most commonly, a student will Pass his/her defense, although Thesis Committee members may have specific points that they would like a student to address in the written thesis document. These are conveyed either in writing or in one-on-one meetings.
    - In cases in which there are more significant deficiencies in the thesis, the Thesis Committee may assign a score of Pass with Conditions. When this occurs, the Thesis Committee chair will provide a timeline for the student to address the concerns in a revised thesis document. This timeline must be within constraints imposed by the Graduate School. According to Graduate School policy, the final, formally approved dissertation must be submitted to the Graduate School within 60 days of the thesis defense unless an extension is approved by the Graduate School.

- **Required Forms:** Graduate School - Resources & Forms - CU Anschutz
    - Below forms must be submitted 4 weeks before the exam:
        - Biosketch Form (This is a graduate school form, not the NIH form)
        - Exam request form
    - Thesis Approval form should be initiated prior to your exam date and completed by Graduate School Deadlines (see Deadlines tab, Graduation Deadlines Thesis for the appropriate year).
    - Watch how to prepare the correct forms and upload your dissertation.
    - The Defense Report, which is the form on which Committee members indicate the score of Pass, Pass with Conditions, or Fail, will be sent directly to the committee by the Graduate School.

- **Thesis Defense Resources and Dissertation Guidelines**
    - Thesis & Dissertation/ProQuest Format & Guidelines
    - ProQuest General Information for Submitting Dissertation & Thesis page 13 on Graduate School website
    - Graduate School Deadlines, Forms, Policies

Policies and Procedures

Pharmacology and Molecular Medicine Program

- **Academic Progress and Remedial and Disciplinary Actions**

  Students must follow the academic schedule in this Handbook. Unexcused delays in meeting requirements may lead to dismissal. In rare cases, the GTC may allow remediation with added conditions. Failure to meet these conditions will result in dismissal.

  Satisfactory academic progress is defined as:

  - **Pharmacology courses**: Grade **B or better** required (B– or below = fail).
    - A single failing grade may be remediated (usually via independent study, make-up exam, or an alternative proposed by the course director(s).
    - Grades of C or below, or lack of remediation options require retaking the course.
    - Failed remediation will result in a dismissal from the program's recommendation.
    - Eligibility for taking the preliminary examination requires passing grades in PHCL 7606 and PHCL 7620.
  - **Other courses**: Grade **B or better** required. Courses with grades of B- or below are required to be remediated or retaken and the cost is the responsibility of the student. A student can elect to take a different course to replace an elective course with a grade of B- or below, but only for elective courses.
  - Students must pass **preliminary and comprehensive exams**

  Unsatisfactory progress in dissertation work is cause for serious concern. The Thesis Advisory Committee for each student, which meets with the student and mentor every six months, will assess progress.

  - If the Thesis Committee deems progress inadequate, the student and thesis mentor will meet with the Program Directors, the Thesis Advisory Committee chair, and the GTC to ascertain whether the student can continue in the program. A recommendation of dismissal is a possible outcome of these deliberations.
  - If the student is allowed to proceed further, an additional unsatisfactory assessment of thesis work will be cause for a mandatory recommendation for dismissal to the Graduate School without further review, subject only to appeal by the student (see appeals).

- **Obligations**
  - Attend and participate in ALL PharMM related events, activities, monthly student lunches, and seminars.
  - Serve on at least one PharMM specific committee (PharMM Student Research Day, Retreat, Recruitment, ORE student representative, Student Life).
  - Attend and participate in student-led practice talks for your colleagues.
  - 2nd and 3rd year students are required to attend Journal Club (PHCL 7602). A student is permitted 2 excused absences per year but must produce a thorough written discussion of the paper discussed in the missed session to be turned into the course director.

- **Expectations:** The Pharmacology and Molecular Medicine Ph.D. Training Program's student expectations can be found in Appendix 9.

- Procedure for leave reporting:
    - **Vacation and Holidays** - Trainees may receive the same vacations and holidays available to individuals in comparable training positions at the grantee or sponsoring institution. Trainees shall continue to receive stipends during vacations and holidays. At academic institutions, the time between semesters or academic quarters (including summer) is considered an active part of the training period, not a vacation.
    - If student funding is obtained from a source other than the NIH, the other funding institution may provide leave guidelines that differ from those outlined above. In such cases, the guidelines from the relevant funding institution shall apply.
    - **Sick Leave and Other Leave** - Trainees may continue to receive stipends for up to fifteen calendar days of sick leave per year. Under exceptional circumstances, this period may be extended by the awarding component in response to a written request from the training Program Directors or the sponsor. Sick leave may be used for the medical conditions related to pregnancy and childbirth pursuant to the Pregnancy Discrimination Act (42 USC 2000 e (k)).
    - **Parental Leave** - Trainees may also continue to receive stipends for up to sixty calendar days of parental leave per year for the adoption or the birth of a child when those in comparable training positions at the grantee or sponsoring institution have access to paid leave for this purpose. Either parent is eligible for parental leave. For trainees, the use of parental leave must be approved by the training Program Director(s). A period of terminal leave is not permitted, and payment may not be made from grant funds for leave not taken.
    - **Unpaid Leave** - Individuals requiring extended periods of time away from their research training experience, which could include more than fifteen calendar days of sick leave or more than sixty calendar days of parental leave must seek approval from the awarding component for an unpaid leave of absence. Approval for a leave of absence must be requested in advance by the training grant Program Director and be countersigned by an authorized institutional official.
    - **Leaves of Absence** - During a leave of absence, documentation to suspend the period of appointment must be completed by submitting an amended Statement of Appointment Form and a Termination Notice. These forms should be submitted to the awarding component at the beginning of the leave. At the resumption of NRSA support, the reappointment must be documented on another Statement of Appointment Form

- **AI Policy:** Guidelines for the Use of AI and Machine Learning Tools in PharMM Courses

  The recent emergence of freely accessible Artificial Intelligence (AI) platforms that use large language models and other generative algorithms necessitates new guidelines to ensure that students understand when and when not to use these tools. Their benefits include enhancing scientific writing, accelerating the writing process, and reducing barriers to non-native English speakers. Major potential drawbacks also exist, however, including the potential for false or inaccurate information, breaches of confidentiality, plagiarism, and depriving students the critical tasks of working through problem sets that reinforce core didactic material. Thus, improper use of AI tools has the potential to undermine the learning objectives of the program.

  This policy establishes a simple set of guidelines for acceptable and unacceptable use of AI language model tools in the PharMM program, including courses and exams. Our goal is to promote

acceptable use of new technology while maintaining our overall goals and standards for training. Failure to follow these guidelines may result in disciplinary action. Any questions regarding this policy and its implementation should be directed to the Course Directors and/or Program Directors.

Please note that these guidelines are minimum expectations and in cases where guidance is stricter, these policies are superseded by any specific guidelines provided by Course Directors (i.e. you must attend to any guidance provided by Course Directors and instructors for those relevant courses); Principle Investigators (as a member of a laboratory group, you must respect the wishes of use by your PI as long as the use of AI is ethical); or any other guiding body(e.g. thesis advisory committees).

Generally acceptable use

If you use AI tools for these purposes, you must be transparent about their use. Citation of any use should be included in the bibliography of your written document: include the name of the specific tool (and version) and how it was used. For example, ChatGPT, v4 was used to evaluate the grammar in this proposal. Suggestions from this evaluation were included in the final draft.

1. Language and grammar checks. Except for course exams (see below), AI tools can be used to check or edit your original text drafts for grammatical errors. This provides an opportunity for you to learn rules and best grammatical practices.
2. Coding help. AI tools can help translate code between computer languages, explain code structures and principles, and teach you to code as a tutor might. These methods can be problematic if too many errors creep in, but in general, you may find it helpful to design your own tutorials driven by your own questions and curiosity that AI tools can help with.

Generally unacceptable use

1. Answering test questions for courses. Exams in PharMM courses are intended to challenge you to think and translate your thoughts into original answers that are then evaluated by the course directors. During course exams, AI tools cannot be used at all, even to make suggestions to improve grammar and clarity in your writing.
2. Deriving answers and generating new text for homework and writing assignments for courses. While AI tools can be used to evaluate the grammar of your own, original written content, and make suggestions to improve grammar and clarity, they cannot be used to generate new content for homework assignments. Also, verbatim use of sentences generated by AI tools will be considered plagiarism.
3. Identifying topics/potential experiments and generating new text for comprehensive exam proposals. These exams are intended to evaluate your ability to identify important scientific problems and experiments that address them, as well as to translate this knowledge into a written grant proposal. While AI tools can be used to evaluate the grammar of your own, original written content, and make suggestions to improve grammar and clarity, they cannot be used to generate new written content in your preliminary exam or comprehensive exam proposals. Verbatim use of sentences generated by AI tools will be considered plagiarism.
4. Drafting peer review summaries. You may not use AI tools to generate summaries or reviews of your classmates' work. Peer review is an excellent opportunity to sharpen your critical thinking and evaluate alternative ideas on a topic, and provides a unique opportunity for practicing concise written communication. Use this opportunity to consider the proposal from your peer and provide your own perspective. Using AI tools to generate summaries or reviews denies you

this opportunity, and denies your peer from gaining your perspective. Furthermore, uploading content from another individual's proposal to an AI tool may violate confidentiality and considered academic misconduct, as the uploaded content may be disseminated or used for other purposes without your consent.

In general, you should follow the principles outlined below as you navigate the use of AI in your graduate work:

Developed collaboratively with Campus Health Sciences Faculty Committee.

We, as members of the AMC Community, strive to be innovative and curious in our approach to the use of new technology. Especially, given our commitment to improving health and biomedical research, we are responsible to approach the use of these tools with integrity and professionalism.

1. Never enter identifiable patient data/information into third party tools.
2. If using tools to assist with clinical decision-making, ensure these are approved by the health system and based on best available evidence.
3. Familiarize yourself with the pitfalls of various tools such as bias, hallucinations, incorrect information. In particular, for our PhD students, all should be aware of the tendency for LLM chatbots to fabricate fake citations and other information.
4. Be vigilant about the presence of biases in work generated by AI/ML; strive to mitigate the dissemination of these biases.
5. Avoid use of AI/ML to replace successful, evidence-based study strategies given concern these tools may negatively impact learning. For example, work through problem sets on your own or with classmates rather than leaning on AI tools. The goal in a PhD program is for you to learn, not to check boxes.
6. Critically evaluate any AI/ML generated responses with knowledge from course work and other resources.
7. Be honest and transparent about the use of AI and ML tools in curricular work such as studying and assignments. Citation of use should include name of the specific tool (and version) used and how it was used (e.g. editing first draft for grammar; syntax help in Python code). Ex: ChatGPT, v4 was used to edit my first draft for clarity and brevity.
8. Failure to cite use of outside tools may be considered plagiarism and will be addressed in the same way other academic professionalism lapses would be.
9. Approach new technology and tools with curiosity but always maintain intellectual integrity.

v.1 2024, sources Campus Guidelines

- Communication
    - Please be sure to note the announcements posted on the several bulletin boards located outside of the 6th Floor of RC 1 North and South. Email to your assigned cuanschutz.edu (domain address) is the primary form of written communication both within the Program and the University as a whole. Please check your email regularly: as a minimum, twice a day.
- External Employment
    - External employment must not conflict or interfere with any required elements of a student's PhD training or lengthen that training. Examples include but are not limited to:

laboratory research, classes, assessments, seminars, journal clubs, lab meetings, retreats and other required program or ORE activities.

- Graduate students, in good academic standing, may, with appropriate approval, work approximately 10 hours per week in external employment. Such employment must be approved in advance, by the Office of Research Education (ORE), the Student's Program Director for first year students, and by the Program Director and Thesis advisor for those students who have entered a laboratory or who transfer or are directly admitted into a laboratory.

Office of Research Education

- Office of Research Education
- Conflict of Interest (reference to Comps and Thesis committees)
  - Honor Code and Committee Procedures
- Anschutz Email address communication
- Student Badge Requirement: Students must have their University badge visible, on their person, at all times while on campus.
- Financial Aid for Graduate Students
- Residency
- Tuition, fees and stipend
  - All incoming Graduate Students are offered a financial aid package from the Graduate School that includes an annual stipend of **$41,912** (approved for **Academic Year 2025-2026**), tuition costs, and payment of individual student health insurance and activity fees. The Stipend is evaluated on an annual basis for the cost of living. Please note that this support covers the period July 1, through June 30 for continuing PhD students, and August 15, through June 30 for first year PhD students. Payment of annual stipend, along with tuition costs, fees and individual health insurance is dependent upon satisfactory academic progress as defined in the Graduate School and Program policies.

Program Events and Activities

Program Seminar

- The Pharmacology Program Seminar Series is Mondays from 12:00 – 1:00 pm. The seminar series consists of student research updates, faculty membership and invited speaker talks.
- Attendance is required for 1st year through 3rd year students. 4th+ year students are strongly encouraged to attend the seminar.
- 2nd year students are required to provide a Major Seminar presentation. The major seminar is designed both to give the student an opportunity to explore in greater depth areas covered in the didactic curriculum, and to provide experience in the presentation of a thirty-minute seminar. For more information, please see Appendix 4.
- Post- Comps students are required to give a yearly thesis update talk during seminar. This update should be 20-25 minutes.
- Six months after passing the Comprehensive Exam, each student will schedule a Thesis Proposal Seminar outlining the rationale for and method of approach to the student's proposed thesis research project. For more information, please see Appendix 5.

Annual Retreat

PharMM partners with the Department of Pharmacology to hold an off-campus retreat that includes oral presentations, a poster sessions, workshops, and opportunities for informal discussions during meals and free time. These events provide an opportunity for faculty members to present research being conducted in their labs, and for trainees to present posters and oral presentations describing their own research. The retreat will be held in the Spring and attendance at the retreat is required for all PharMM students. Students should contact the Program Administrator and Program Directors if they are concerned about their ability to attend the retreat.

One of the PharMM student committees is the Annual Retreat Committee and will be comprised of students from each year in the program from 2nd to 4th year+. Students help to select speakers and set the agenda, including community building and professional development activities. The retreat is a great oppotunity to build community and share your research.

Student Research Day

The PharMM Student Research Day (September 11, 2025 at Krugman Conference Hall (P15 – 2100)) is a PharMM student organized and led meeting, which includes oral presentations, a poster session, and a professional development session. The Student Research Day Committee will take full responsibility in working with the Program Administrator to develop the program and invite speakers and attendees. This event is an opportunity to highlight the amazing work done by PharMM trainees and to recruit trainees from the BSP and MSTP programs. Attendance for all PharMM trainees is required. Reasons for required attendance include:

- Student Research Day is the single most important event in the year that exposes trainees to the variety of pharmacology research being conducted in the PharMM program.
- The event provides a comfortable, informal venue in which to present your research and discuss science with your CU Anschutz colleagues. This can be great practice for presentations at national conferences later in the year.
- It helps build community and a culture of connection.

All PharMM students that are second-year or above are expected to present their work, as either (or both) a poster or oral presentation.

Student activities

- **Monthly Program Lunches:**
  - Typically, on the third Wednesday of the month, 12:00-1:00pm
  - These lunches are required.
  - Programming varies but Program updates and ORE updates will always be provided. Student celebrations on completing program and career related milestones.

Training grants procedures

Training grant eligibility: Each Spring, the GTC reviews the credentials and eligibility of trainees for support by the PharMM T32 training grant. A second- or third-year student must meet the following eligibility criteria:

1. Meet the US citizen requirement defined by the NIH.
2. Be in good academic standing as defined by the Graduate School, which includes having a GPA average above a B, having passed or in the process of taking all stage-appropriate required courses, and having completed all of the necessary paperwork through the Graduate School.

3. Be a graduate student in a PharMM training faculty lab, which includes all PharMM graduate students. Supplement-eligible trainees can be from other Training Programs, but in a PharMM training faculty lab.
4. Have completed the first-year training plan and have passed the *Preliminary Exam*.

Trainee application process: In the Spring, TGE students are invited to apply with the required material:

1. An NIH-formatted "Fellowship Biosketch." Students are supplied with instructions, provided URLs to NIH instructions, and a template. This serves as preparation for individual F30/F31 fellowship applications.
2. A ~500-word write-up of the student's active or proposed research topic.
3. A ~500-word write-up of what benefits the student will receive from T32 support. The student is asked to describe their career trajectory and goals, along with how this support will help them achieve their goals.

Trainee evaluation process: In addition to the material submitted by the eligible student, the student's academic record from courses completed at CU Anschutz, along with written feedback tracked in GAIA (**Section B**) for rotations, *Major Seminar* (if complete), and *Comprehensive Exams* (if complete) are compiled to constitute the reviewable material for each eligible student applicant. Application packets are shared with all members of the GTC; all GTC members scores each applicant on the holistic scoring rubric, including:

1. Performance in rotations based on rotation mentor feedback and classes based on grades.
2. The trajectory of overall academic progress (is the student consistently strong or improving over time).
3. Written research statement. Is the statement clear and convey the important concepts of the project?
4. Written support statement. Does T32 support align with the student's stated goals and career path?
5. Student Biosketch. Is it well formatted and will it stand up well in F30/F31 review?
6. Is the student engaged in PharMM? Is there evidence for active participation in Program activities?
7. Likelihood of future academic success based on the full set of application material

Scores across all GTC members are compiled and the final ranking is discussed at an in-person GTC meeting.

Recruitment

Around February of each year, prospective student applicants visit our campus for in-person interviews. It is in the Program's best interest to attract and retain the best of these prospective students. To do this we need the help of current students and the PharMM faculty who can convince these individuals that our Program is the place to be! When asked, please be willing to spend some time with prospective students during dinners or other functions. PharMM can flourish with your help.

The Recruitment Committee is one of the PharMM student committees. Recruitment weekends consist of a first night, when the recruits arrive, the full day recruitment, which includes orientation, interviews, lunch, and dinner, and the third day, which includes a brunch and activity before the recruits return home. The committee is responsible for helping to plan the in-person recruitment events, which include the first night dinner (usually students only), buddies (one current PharMM student will escort students arounds campus for in-person interviews), lunch (includes PharMM students, faculty and recruits), second night dinner (will include PharMM students, faculty and recruits), and an the third day brunch and activity (the activity is oriented to show students around Denver and is flexible).

Resources and Support

Students can access a variety of campus services through the links provided below. The Office of Student Affairs is committed to supporting CU Anschutz students by offering guidance and assistance in navigating campus resources. For detailed information about available services or to schedule an appointment, please visit the Office of Student Affairs webpages. For additional questions or support, you may contact the office via email at StudentAffairs@cuanschutz.edu.

- Office of Student Affairs
  - Campus Life
  - Student Support
  - Health & Wellness
  - Student Resources
  - Student Services
- Students Resource Directory
  - Includes all campus resources
- Academic Calendar
- Residency
- Badging Office
- Student Parking & Transportation
  - Eco Pass
  - Campus Circulator (Transportation service)
  - Medical Campus Rail Shuttle
- Office of Information Technology
- Student Health Insurance
- Office of Research Education – Concern Reporting Form (Maxient)
- CU Anschutz Student Outreach and Support Referral
- CU Anschutz Student Request for Medical Leave of Absence
- Graduation Deadlines Thesis, Anschutz
- Thesis & Dissertation/ProQuest Format & Guidelines

Appendices

Appendix 1: MSTP and BSP Additional Requirements

Medical Scientist Training Program (MSTP)

- Prior to the Comprehensive Exam, students who join the Pharmacology Program through MSTP must take the following credits of didact pharmacology-related courses. The Pharmacology Program courses are:
  - BMSC 7820 – Introductory Biostatistics (Fall, 3 cr.)
  - BMSC 7811 - Ethics in Research (Fall, 1 cr.)
  - PHCL 7613 - Journal Club (Fall & Spring, 1 cr.)
  - PHCL 7606 - Receptors and Cell Signaling (Spring, 1 cr.)
  - BMSC 7812 – Rigor and Responsibility (Spring, 1cr.)
  - PHCL 7622 - Principles of Pharmacology for MSTP Students (Spring, 1 cr)
  - Elective (min. 2 hours, either fall or spring; consult with mentor)

Medical Scientist Training Program

- HANDBOOK

Biomedical Sciences Program (BSP)

- Prior to the Comprehensive Exam, students who join the Pharmacology program through BSP must take the didact pharmacology-related courses listed under Year 2.
- BSP students must fulfill all PharMM requirements from year 2 and beyond.

Biomedical Sciences PhD Program

- HANDBOOK

Appendix 2: Direct Admit (Thesis-Lab Track)

Definition: Students in the Thesis Lab-track agree to join a specific laboratory of a PharMM training faculty before admission and forgo laboratory rotations in their first year. Thesis-track students must still go through the full application and admission process as all other students applying to the PharMM program. They will be evaluated in the same pool of applicants, be asked for an in-person interview, perform the in-person interview, and be offered admission into the program based on their individual merit and performance during the application and interview process. Only after they get formal offer from the PharMM program will the applicant be allowed to enter the selected thesis mentor's lab as a direct admit.

- **Thesis Lab-Track Requirements:**

  Thesis Lab-Track students will matriculate with other incoming first-year graduate students in the fall semester, with the same requirements for orientation and other pre-start activities. Thesis Lab-track students must enroll in all first-year courses, and they will be expected to present "post-rotation" talk at the end of the 3rd rotation period describing research progress. The faculty sponsor will also be required to complete an evaluation and provide a grade for the student's lab work at the end of each rotation period.

  Like all first-year graduate students, Thesis Lab-track students will be required to meet with the PharMM's Graduate Training Committee (GTC). The GTC members will also assist the Thesis Lab-track student in preparation of "post-rotation" talks and, also, serve as a resource to help the student navigate through first-year coursework.

  Thesis Lab-track students must adhere to all other Program rules and requirements. Specifically, they will be required to successfully complete the same coursework, examinations, and laboratory research requirements as other students in the Program. Students not meeting these requirements will be subject to dismissal from the Program.

- **Thesis Lab-Track Requirements:**

  A pledge to the following financial risk mitigation with Thesis Lab-track students will be required of all sponsor faculty prior to student matriculation. The ORE assumes fiscal responsibility for students that enter an ORE PhD granting program that are NOT direct admits. The thesis lab mentor will be fiscally responsible for lab-track students from day 1 and ORE does not assume any fiscal responsibility for these students. If a conflict arises within the first year of training that results in the student needing to leave the host laboratory, the sponsor will be financially required to cover up to two additional rotations. If a conflict arises after the first year but before the Comprehensive exam, the sponsor is required to cover one additional rotation. Following the Comprehensive exam, changing labs will be dealt with on a case-by-case basis. An exception to this policy will be granted if the student has failed to remain in acceptable academic standing.

Appendix 3: Rotations and Rotation Seminars

- **Choice of Mentor/Laboratory.** First and foremost, students should choose laboratories and projects that are reasonable possibilities for a student's thesis work. Students should avoid rotations whose main goal is the acquisition of new techniques; there will be plenty of opportunities to learn methods informally among the Program laboratories as the need arises. They should talk to their GTC mentors and the Program Director(s) prior to making rotation decisions. Students should be aware that mentors and their groups put considerable effort into supervision of rotating students. Thus, some faculty may be reluctant to take on a rotation student if they have extensive travel plans, teaching, grant writing, or if their funding is in jeopardy. For these reasons, it is important that students arrange for rotations as far in advance as possible. Rotation students must choose rotation mentors from the curated list of active PharMM training faculty (see Appendix 8, and an updated list can be found on the PharMM website). PharMM leadership actively identifies and recruits training faculty **whose research is relevant to Pharmacology and Molecular Medicine. Thus, PharMM students are not allowed to rotate with faculty who are not members of the program.**

- **Rotation Periods:** Each rotation is ~10 weeks in duration. The second and third lab rotation periods include the winter and spring breaks. Students should discuss specific expectations with their rotation advisors for effort during these breaks. The winter break in particular is quite long, running from mid-December to late January (according to the Graduate School calendar), and students should expect to be working in the lab during most of this period. Students should always discuss time off with their lab mentors in advance. If you need a **Fourth Rotation,** you must request approval from your Program Director. The Program Administrator and Program Director will work with the Office of Research Education accordingly.
    - It is not typical, but if a fourth rotation is required, this is a 6 week rotation that must be started by July 1 of the associated year. The fourth rotation must be approved by the Program Director(s), GTC, and the ORE. The fourth rotation is the last opportunity for a student to find a faculty mentor. If the student fails to find a fourth rotation by July 1 or the fourth rotation advisor does not accept the student into their lab, this will result in a dismissal from the program.

- **Rotation Forms:**
    - A week before the start of the rotation, students are required to submit the PharMM Pre-Rotation Form with their mentor's name for approval from the Program Directors to proceed with the mentor selected. This form is required for all three rotations.
    - After identifying a rotation mentor, students are required to submit the ORE Milestone Rotation Form no later than 1 week after the start of the rotation. This form is required for all three rotations.

- **Rotation Grades:** Final grades for rotations will be based on the evaluation of the lab rotation advisor and the seminar presentation. These reports are sent to the student, the Program Directors for PharMM, and Program Administrator. It is also very important that students meet with their rotation advisors after their rotation talks to discuss strengths and weaknesses in performance during the rotation and suggestions for improvement.

Students will be expected to show improvement in identified weaknesses in subsequent rotations and seminars. Failing a rotation (B minus or below) will be considered a serious academic deficiency that may require further action by the GTC (see Academic Standards).

- **Rotation Seminar:** Students should consider the following elements when designing their talk:
  - Introduction: a short statement of the question or problem addressed by the rotation.
  - Background: describe the significance of the question in broad terms for a diverse audience. Describe previous work and its relationship to the project.
  - Specific aims: what were the experimental goals proposed to address the hypothesis?
  - Methods and Design: explain any unusual strategies or techniques employed. Results and
  - Conclusions: the results should be presented in a straightforward and logical manner. Conclusions should be summarized briefly.
  - Future direction: at the end of the talk, the student should provide a brief summary of results and how, in the students' opinion, they should be followed up on.

  Several other specific suggestions for effective talks include:
  1. Students should remember that they are addressing a general pharmacology audience and avoid the use of specialty-specific terminologies and jargon.
  2. Avoid reading or memorizing your presentation, if at all possible. Wooden, canned deliveries are dull and very hard for audiences to follow.
  3. Prepare and use simple, effective visual aids. Remember that effective communication of data and ideas is your goal.
  4. Both faculty and students are encouraged to ask questions after rotation seminars. A few of these questions may be intended to probe your understanding of your research rather than illuminate an area of confusion. Consider audience questions carefully. Make sure that you understand the question before answering. Repeat the question or ask for a rephrasing if you need to. Take a moment to formulate a coherent answer. If, after contemplation you don't know the answer, don't be afraid to say so. We all get stumped from time to time!

- **Expectations for Effort:** While first year students have a substantial course load, the program expects that sufficient time will be devoted to the rotation project. For professionals in training, it is not appropriate to require a minimum number of hours for rotation work. Strong self-motivation is an essential characteristic for an independent scientist, and we expect our students to demonstrate this quality throughout their training. In this regard, students should expect to be in the lab beyond the normal working hours from time to time, i.e., in the evenings and on weekends. This commitment of time is especially important when long, complex experiments are being done. A major part of the mentor's rotational assessment (as well as his/her willingness to accept a student) will be based on the degree and quality of effort in the lab.

Appendix 4: Major Seminar

Each student is required to present a Major Seminar in the Spring (usually April/May) of the second year. Each student presents a thirty-minute seminar discussing a focused area within the scientific literature. The topic area for this seminar *cannot* be the student's planned thesis project directly, but a topic area that is closely

related to the intended thesis project and is aimed to broaden the research expertise of the student. **The student must select a mentor for their major seminar. The mentor must be a member of the PharMM Training Faculty and cannot be their thesis advisor.** Students must submit a Major Seminar Form (see Appendix 11) to the Program Director(s) and Program Administrator at least one month prior to the scheduled presentation for approval by the Graduate Training Committee.

The seminar is based on a small number of published papers (usually two to four) that permit a focused discussion concerning an area of contemporary scientific investigation. The seminar is prepared with the assistance of a faculty advisor. During the seminar, the student will introduce the area to be discussed, present and critically review the material presented in the manuscripts chosen during the preparation phase and synthesize this material into a summary reflecting the student's understanding both papers in specific, and the area of study as a whole. The seminar is graded on a pass/fail basis by the faculty in attendance. The following are important considerations regarding the major seminar.

- **Goals**
  The seminar should present an integrated review of a focused area of research. The relevant papers should be selected so that their combination provides much more insight than any single paper. Alternative hypotheses should be formulated to account for the results, especially if the authors neglected to follow this step. The goal is not merely to report what was published, but to bring insight, criticism, synthesis, and conclusions to the presentation.
- **Style/Organization**
  A well-organized, substantive seminar is diminished by poor speaking technique. Both style and substance are important. The student should be sufficiently familiar with the main organizational points of the seminar that they can present it without notes. The seminar should be practiced sufficiently to emphasize the clarity of argument and to refine the style of presentation, demonstrating mastery of the material under study.
- **Judgment**
  The choice of subject matter, visual aid materials, points for emphasis, criticisms and conclusions all should reflect careful professional judgment. The members of the faculty will examine and critique the student's ability to discriminate between more and less important issues, and to project confident scientific judgment. A key determinant in developing this judgment is self-reliance. The student should be so familiar with the topic that they become experts. Reading extensively and choosing material of strong interest to the student are critical factors in preparing a successful seminar.
- **Critical Capability**
  Another important goal of the seminar is to hone the student's critical capabilities. The student should avoid the selection of short manuscripts, especially preliminary accounts. The faculty are aware that these manuscripts are less likely to be either fully developed or comprehensively researched. Consequently, the student's performance will be viewed less enthusiastically by the faculty under these circumstances. In developing criticisms, the student should emphasize defects in what was done: Does the experiment address the hypothesis adequately? Are there other hypotheses that should be considered? Does an experiment have adequate controls? Are additional experiments required? The student should be familiar with all aspects of the experimental details, including theory and instrumental methods.

- **Initiative**
  The seminar is the product of the *student*. The advisor should not play an overly central role in the gathering of information. Advisors should give some general directions, listen to practice seminars, and offer critiques of effort. The student should read most or all of the references in the chosen publications and as many subsidiary references as it takes to produce a quality seminar without relying very heavily on the advisor for research, factual information, or the synthesis of investigations.

A record and evaluation of the Major Seminar will be entered in GAIA by the Major Seminar Advisor (https://gs.ucdenver.edu/gaia/). The GAIA report may be replaced by a Milestones report in the future.

Appendix 5: Thesis Proposal

The student's Theis Adivsory Committee (TAC) and members of the faculty, student body and staff attend this seminar. Open attendance provides both the student and the advisor with an opportunity to receive ideas and criticism from a broad spectrum of individuals, ensuring that the proposed project is both suitable and achievable.

Thesis proposal seminars are followed by thesis update seminars on an annual basis, as well as TAC mandatory meetings at least every six months between updates. Update seminars provide a good opportunity for the student's TAC to review the student's progress and to invite input from the faculty as a whole, as well as afford the student opportunities to polish presentation skills. A student in consultation with his or her advisor, and with the approval of the Chair of the GTC, should select a committee member outside of the PharMM training faculty (see below) by the date of the first thesis update (i.e., on or around one year in thesis laboratory). Following each TAC meeting, a record the meeting will be entered in GAIA from the Chair of the TAC (https://gs.ucdenver.edu/gaia/). GAIA reports may be replaced by Milestones in the future.

Six-month meetings with the TAC are mandatory; failure to meet within the six-month time frame will result in denial of registration for the next academic semester.

Appendix 6: Individual Development Plan

- An IDP is required for all PharMM students. The format of the IDP is up to the discretion of the mentor and mentee. An example can be found at: https://www.science.org/content/article/myidp

Appendix 7: Thesis Committee Meetings

- **Frequency and Duration of Thesis Committee Meetings**
  - Thesis Committee meetings should occur once every 6 months and scheduled for 1 hour. Longer meetings are acceptable if needed.
  - As a student approaches the completion of his/her thesis research, it may be appropriate to have more frequent meetings.
  - The student and student's thesis mentor are primarily responsible for ensuring that the meetings occur at the appropriate time.
  - A record of the meeting will be made by the Thesis Advisory Committee Chair through GAIA or Milestones.
  - The student is required to send a thesis update report to the Thesis Advisory Committee 2 days before the scheduled meeting described in the following section.

- **Requirements for Thesis Committee Meetings (Pre-meeting summary and meeting schedule)**
  - At least 2 days prior to the meeting, the student should send the Thesis Committee members an outline of progress since the last committee meeting (or Comprehensive Exam). Please refer to the Committee Meeting Form found in Appendix 16.

- **Committee Meeting Form:** Please fill out the form and distribute it to your Committee members and Program Administrator no later than one week prior to each committee meeting.
  - This form will serve as a record of your accomplishments and your progress toward completion of your thesis research.
  - Upon completing this form, please make sure to update your student profile in GAIA with any changes, additions, or accomplishments.
  - Please refer to the Committee Meeting Form found in Appendix 16.

- **Evaluation of student progress at Thesis Advisory Committee meetings**
  - Thesis Advisory Committee meetings are primarily designed as a mechanism for students to get feedback on their science from experts. The committee conveys this information both during the meeting as well as after the meeting through thesis committee report.

Appendix 8: PharMM Graduate Faculty

- **Quick Reference table for membership**
- Graduate Training Committee
  - **Mark L. Dell'Acqua, Ph.D** **Chair, Professor**
  - **Jim Costello, Ph.D.** **Associate Professor**
  - **Jason Aoto, Ph.D.** **Associate Professor**
  - **J. David Port, Ph.D.** **Professor**
  - **Mair E. A. Churchill, Ph.D.** **Professor**
  - **Katharine Smith, Ph.D.** **Associate Professor**
  - **Matthew Kennedy, Ph.D.** **Professor**
  - **Tatiana G. Kutateladze, Ph.D.** **Professor**
  - **Tim McKinsey, Ph.D.** **Professor**
  - **Fabrice Dabertrand, Ph.D.** **Associate Professor**

- **Faculty Members, Their Affiliations And Their Research Interests**
  - **Aoto, Jason, Associate Professor**
    Pharmacology, NRSC, BSP, PHCL
    Ph.D. 2009, Stanford University
    *Interrogating how synaptic cell-adhesion molecules function to shape cell-type & synapse-specific synaptic transmission properties***.**
  - **Bankston, John, Associate Professor**
    Physiology and Biophysics, PHCL, NRSC, STBB
    Ph.D. 2009, Columbia University

Molecular mechanisms of ion channel function. Examining structural and regulatory mechanisms of the Acid-sensing ion channels using electrophysiology, fluorescence, spectroscopy, and structural biology.

- **Bates, Emily, Associate Professor**
  Pediatrics, Developmental Biology, NRSC, BSP, PHCL
  Ph.D. 2005, Harvard Medical School
  The Bates lab is studying the effects of fetal exposures to CBD and nicotine using mice as a model.
- **Bayer, K. Ulrich, Professor**
  Pharmacology, MOLB, MSTP, NRSC, BSP, PHCL
  Ph.D. 1996, Heinrich-Pette-Institute
  Molecular memory mechanisms in cellular signal transduction and neuronal function; CaMKII and Ca2+ signaling.
- **Benke, Timothy A., Professor**
  Pediatrics, Neurology, PHCL MSTP, NRSC
  MD/Ph.D. 1995, Baylor College of Medicine
  Mechanisms of synaptic plasticity and impacts of development and epilepsy.
- **Bitler, Benjamin, Associate Professor**
  Obstetrics and Gynecology, CANB, BSP, PHCL
  Ph.D. 2010, University of Arizona, Tucson
  The Bitler Lab is focused on improving the understanding of ovarian cancer biology and developing strategies to overcome epigenetic-mediated therapy resistance.
- **Black, Joshua, Associate Professor**
  Pharmacology, MOLB, CANB, PHCL
  Ph.D. 2008, UCLA
  *Understanding how the chromatin microenvironment regulates genome stability, cancer cell heterogeneity and chemotherapeutic response***.**
- **Bouchard, Gina, Assistant Professor**
  Pharmacology, BMSC
  Ph.D. 2016, University of Sherbrooke
  The Bouchard lab investigates metabolic reprogramming within the irradiated tumor microenvironment through a spatial biology approach. We utilize a variety of models including 3D patient-derived assembloids and tissues to investigate cellular rearrangements following treatment with the primary goal of uncovering spatial features linked to metabolic resistance, ultimately aiming to enhance the effectiveness of radiotherapy in cancer patients.
- **Brambati, Alessandra, Assistant Professor**
  Pharmacology
  Ph.D. 2015, University of Pavia
  We study the molecular mechanisms that regulate DNA repair and genome instability, focusing on non-canonical DNA double-strand break (DSB) repair pathways. DSBs are one of the most toxic forms of DNA damage. If left unrepaired or repaired inaccurately, DSBs can lead to mutations, chromosomal rearrangements, and even cell death. Effective DSB repair is therefore essential for preserving genomic stability and preventing a range of diseases and cellular malfunctions.
- **Bruce, Kimberley, Associate Professor**

Pharmacology, NRSC, BSP, MSTP
Ph.D. 2006, Portsmouth Univ., UK
Identifying the molecular mechanisms underlying lipid metabolism in the central nervous system and developing novel strategies that target lipid processing in the brain to treat neurodegenerative disease.

- **Caino, M. Cecilia, Associate Professor**
  Pharmacology, BSP, CANB, PHCL
  Ph.D. 2010, University of Buenos Aires
  Protein kinase C isozyme-specific regulation of cancer cell biology using prostate cancer and lung cancer models.
- **Christie, Jason, Associate Professor**
  Pharmacology, NRSC, MSTP, BSP, PHCL
  Ph.D. 2004, Oregon Health & Sci Univ.
  We study the mechanisms of neural plasticity and the relationship of these processes to motor learning.
- **Claw, Katrina, Assistant Professor**
  Biomedical Informatics, HMGGP, PHCL, BSP
  Ph.D. 2013, University of Washington
  My research focuses broadly on personalizing medicine, using genetic information and biomarkers for tailored treatment, in relation to pharmacogenomics.
- **Costello, James, Associate Professor**
  Pharmacology, BSP, MSTP, CANB, PHCL, CPBS
  Ph.D. 2009, Univ. of Indiana
  Systems and network biology approaches to link genetics to drug response (pharmacogenomics); Computational modeling for drug sensitivity prediction in bladder cancer.
- **Dabertrand, Fabrice, Associate Professor**
  Anesthesiology, PHCL, NRSC
  Ph.D. 2006, Univ. of Bordeaux Segalen, France
  The control of cerebral blood flow by ion channels and calcium signaling in the pericytes, endothelial cells, and smooth muscle cells that constitute the brain microcirculation. We use this information to combat brain diseases with a vascular component.
- **Dell'Acqua, Mark L., Professor and Vice Chair of the Department of Pharmacology**
  Pharmacology, MSTP, NRSC, BSP, PHCL
  Ph.D. 1995, Harvard University
  Organization of signaling complexes by protein kinase and phosphatase anchoring proteins; mechanisms regulating neuronal second messenger signaling in synaptic plasticity
- **Dietz, Robert, Assistant Professor**
  Neuroscience, PHCL, BSP, NRSC
  MD/Ph.D. 2010, University of New Mexico School of Medicine
  Restoration of Hippocampal Function Following Global Ischemia in the Developing Brain
- **DiGregorio, David, Professor**
  Neuroscience, PHCL, MSTP
  Ph.D. 2000, University of California, Los Angeles

Deciphering dendritic computations of GABAergic interneurons within neural circuits; From biological decision making and temporal learning to ultra-edge AI, Contribution of somatic and dendritic targeting interneurons to temporal coding of sensory context.

- **Edelstein, Charles L., Professor**
  Medicine, PHCL, REDH
  Ph.D. 1999, University of Stellenbosch; M.D., 1979, Univ. of Cape Town
  I am a physician scientist. I do basic translational research as it relates to mechanistic target of rapamycin complex 1/2 (mTORC1/2) signaling and related pathways in kidney and heart.
- **Ernst, Patricia, Professor**
  Pediatrics, PHCL, MSTP, BSP, MOLB
  Ph.D., UCLA.
  Hematopoietic stem cell development and maintenance; role of mixed lineage leukemia gene in blood cell development, differentiation and leukemia.
- **Espinosa, Joaquin, Professor**
  Pharmacology, MSTP, MCDB, CANB, HMGGP, PHCL
  Ph.D., Universidad de Buenos Aires
  Mechanisms of gene expression control with emphasis in cancer biology and Down syndrome
- **Fernandez-Marino, Ana I., Assistant Professor**
  Pharmacology, BSP, NRSC
  MSc, Ph.D. 2013, Universiy Pompeu Fabra. Barcelona. Spain
  My lab uses electrophysiological techniques to measure the voltage-gated ion channel function in real time and structural biology to visualize the 3D architecture of these membrane proteins at near-atomic detail. By understanding how these channels gates open, close, and misbehave in disease, we can pinpoint the root causes of these channelopathies and, ultimately, guide the development of targeted therapies like nanobodies that can restore their proper function.
- **Ford, Christopher, Professor**
  Pharmacology, BSP, NRSC, PHCL
  Ph.D. 2003, University of Alberta
  We study the synaptic mechanisms by which neuromodulators like dopamine and acetylcholine are encoded in mesolimbic and nigrostriatal circuits through their G-protein coupled receptors and the alterations that occur in these systems in neurological and psychiatric diseases.
- **Ford, Heide L., Professor and Chair of the Department of Pharmacology**
  Pharmacology, CANB, MOLB, MSTP, IPHYS, PHCL
  Ph.D. 1995, Univ. of Rochester
  Parallels between normal development and tumorigenesis/metastasis with a focus on the role of the Six1/Eya transcriptional complex in TGF-beta signaling, epithelial to mesenchymal transition, cancer stem cells, and metastasis.
- **Gignoux, Christopher R, Associate Professor**
  Biomedical Informatics, HMGGP, BSP, PHCL
  Ph.D. 2013, University of California, San Francisco
  Large-scale methods and applications in personalized medicine and multiancestry studies
- **Greene, Casey S, Professor and Chair of the Department of Biomedical Informatics**
  Biomedical Informatics, BSP, PHCL, CPBS

Ph.D. 2009, Dartmouth College
Open science, machine learning, and the transcriptome

- **Jacobelli, Jordan, Associate Professor**
  Pharmacology, IMMU, BSP, MSTP
  Ph.D. 2002, University of Rome 'La Sapienza', Italy
  We focus on how the cytoskeleton generates the mechanical forces and shape changes required for lymphocyte migration and trafficking during homeostasis and disease.
- **Janetzko, John, Assistant Professor**
  Pharmacology, STBB
  Ph.D. 2017, Harvard University
  We study the molecular mechanisms that underpin G protein-coupled receptor (GPCR) signaling in health and disease. Using chemical and structural/biophysical approaches, including single-molecule fluorescence, mass spectrometry and cryo-electron microscopy, we aim to understanding signal transduction at the molecular level. Our work aims to connect fundamental questions in signal transduction with novel approaches to target aberrant GPCR signaling in disease.
- **Jordan, Craig T., Professor and Division Chief of Hematology**
  Medicine, PHCL, BMSC, CANB, MOLB, MSTP
  Ph.D. 1991, Princeton University
  The biology and molecular characteristics of leukemia stem cells (LSCs), with a particular emphasis on those properties mediating growth and survival.
- **Kennedy, Matthew, Professor**
  Pharmacology, NRSC, PHCL, BSP
  Ph.D. 2003, Univ of Washington
  Molecular mechanisms of activity-triggered synaptic remodeling
- **Kutateladze, Tatiana G., Professor**
  Pharmacology, MOLB, MSTP, STBB, BSP, NRSC, PHCL
  Ph.D. 1988, Moscow State Univ.
  Biochemistry and structural biology, NMR and crystal structures of proteins implicated in cancer, structure based drug design
- **Lahm, Timothy, Professor**
  Medicine, PHCL
  MD 2000, University of Heidelberg
  Pulmonary hypertension, right heart failure, sex differences in cardiopulmonary disease, estrogen signaling in the lung and right ventricle, angiogenesis and endothelial cell function in pulmonary vascular disease and right heart failure, hypoxia-induced cardiac and lung vascular remodeling, neurohormonal signaling in right heart failure, androgen signaling in asthma
- **Lau, Edward, Assistant Professor**
  Medicine, Pulmonary, BSP, PHCL
  Ph.D. 2014, University of California, Los Angeles
  Pulmonary hypertension, right heart failure, sex differences in cardiopulmonary disease, estrogen signaling in the lung and right ventricle
- **McKinsey, Timothy A., Professor**

Medicine, Division of Cardiology, PHCL, MOLB
Ph.D. 1998, Vanderbilt Univ.
Epigenetic regulation of heart failure; signaling and transcriptional mechanisms of muscle disease.

- **Oh, Won Chan, Associate Professor**
  Pharmacology, NRSC, PHCL, BSP
  Ph.D. 2013, University of California, Davis
  We study molecular and cellular mechanisms of activity-dependent synaptic and circuit remodeling primarily through live-imaging approaches using two-photon microscopy and photostimulation in vivo and in brain slices, combined with electrophysiology and molecular genetic manipulations.
- **O'Hare, Justin, Assistant Professor**
  Pharmacology, MSTP, NRSC
  Ph.D. 2017, Duke University
  We investigate how a neuron's dendritic arbor supports the formation of new, experience-dependent receptive fields that serve as building blocks for new memories. Using place fields in mouse hippocampal area CA1 as a model system, we combine molecular and systems neuroscience approaches to understand (1) how dendrites integrate multiple, complementary streams of synaptic input from distinct brain circuits to inform somatic action potential firing and (2) how these dendritic integrative rules are updated during place field formation and behaviorally-manifested learning.
- **Petrache, Irina, Professor**
  Medicine, PHCL
  MD 1992, Carol Davila University of Medicine and Pharmacy
  Pathogenesis of chronic obstructive pulmonary diseases and discovery of targets for therapy
- **Quilinan, Nidia, Associate Professor**
  Anesthesiology, BSP, PHCL, NRSC
  Ph.D. 2010, Vollum Institute
  Our research is focused on excitability and plasticity changes in the brain following ischemic insults such as cardiac arrest and stroke.
- **Saba, Laura, Associate Professor**
  Pharmaceutical Sciences, CPBS, BIOS, PHCL
  Ph.D. 2007, University of Colorado
  Develop and apply state-of-the-art statistical methods to high-throughput genetic/genomic data. The goal of these methods is to identify biological pathways associated with disease and to promote the discovery of druggable targets.
- **Sardar, Debosmita, Assistant Professor**
  Pharmacology, BSP, CSDV, NRSV
  Ph.D. 2016, University of Utah
  At the Glial Epigenetics Lab, we are interested in the big broad question of how we perceive and respond to the world around us through our senses. Towards this, we are specifically interested in the sensory experience of smell. In our lab, we use mouse models to approach the smell system at a cellular scale of studying non-neuronal glial cells, and at a molecular scale of epigenetics. Together, our work will provide insights into how glial cells and epigenetics play together to shape sense of smell.

- **Schweppe, Rebecca E., Professor**
  Medicine, Endocrinology, Pathology, BSP, CANB, IPHY, MSTP, PHCL
  Ph.D. 2000, University of Colorado Health Sciences Center
  The focus of my lab is to identify novel molecular targets relevant to papillary and anaplastic thyroid cancer (PTC and ATC) with the ultimate goal of advancing these studies to clinical trials for thyroid cancer patients who do not respond to standard treatments.
- **Sikora, Matthew, Associate Professor**
  Pathology, PHCL, CANB, MOLB, BMSC
  Ph.D. 2011, University of Michigan
  Steroid hormones; anti-estrogen; breast cancer
- **Smith, Katharine, Associate Professor**
  Pharmacology, NRSC, BSP, PHCL
  Ph.D. 2010, University College London
  Molecular mechanisms underlying disrupted Excitatory/Inhibitory (E/I) balance and relevance to neuropsychiatric disease.
- **Sucharov, Carmen, Professor**
  Medicine/Cardiology, PHCL, CRD, MSTP, IPHY
  Ph.D. 1997, Universidade Federal do Rio de Jenerio
  Translational and molecular research focused on children with heart disease.
- **Sussel, Lori, Professor; Director of Research, Barbara Davis Center for Diabetes**
  Molecular Biology, BSP, PHCL, CSDV, BIOE
  Ph.D. 1993, Columbia University
  We are interested in the molecular mechanisms regulating pancreatic islet function in normal and disease conditions. In particular, we study the transcriptional programs, long non-coding RNAs, and RNA processing events that regulate pancreatic identity and function and how disruption of these programs leads to islet dysfunction and diabetes.
- **Todorovic, Slobodan, Professor**
  Anesthesiology, PHCL, MSTP, NRSC, BMS
  MD 1982, University of Belgrade, Ph.D., University of Illinois School of Medicine
  We investigate the role of voltage-gated calcium channels in the molecular mechanisms of analgesia and anesthesia.
- **Torres, Raul, Professor**
  Immunology and Microbiology, PHCL, IMMU, BSP, MSTP, MDON
  Ph.D. 1992, Univ. of Washington
  Negative regulation of CD8 T cell antigen receptor signaling and promotion of an immune suppressive tumor microenvironment by lysophospholipid GPCRs
- **Tucker, Chandra L., Professor**
  Pharmacology, BSP, MOLB, MSTP, STBB, PHCL
  Ph.D. 1999, Univ. of Washington
  Study and manipulation of protein homeostasis and signaling pathways in live cells, optogenetic tools for controlling protein interactions, synthetic biology, cytosolic protein misfolding, yeast genetics/genomics in eukaryotic cells. Pulmonary surfactant proteins – structure and function.
- **Verneris, Michael, Professor**
  Pharmacology, IMMU, BSP, MSTP

MD 1992, Brown University
The ultimate goal of our research is to develop cellular therapies that are less toxic than existing therapies and can be used to treat cancer or the complications of chemotherapy.

- **Weiser-Evans, Mary, Professor**
  Medicine, Renal Division, PHCL, CSDV, PHSL, IPHYS, MSTP
  Ph.D. 1992, Colorado State Univ.
  Defining the molecular signaling mechanisms regulating vascular smooth muscle cell function in the setting of vascular fibroproliferative diseases, including restenosis and pulmonary hypertension.
- **Zhang, Fan, Assistant Professor**
  Computational Bioscience, BSP, EPID, IMMU, MSTP, PHCL
  Ph.D. 2017, Worcester Polytechnic Institute
  The Zhang lab develops advanced statistical machine learning methods and systems immunology approaches for translational medicine. Specifically, we focus on 1) novel computational method development, 2) large single-cell multi-modal sequencing data integration, 3) cutting-edge systems immunology approaches, and 4) disease association modeling for translational medicine.

- **Affiliated Members, Their Affiliations And Their Research Interests**
  - **Churchill, Mair E. A., Professor ***
    Pharmacology, MICB, MOLB, MSTP, STBB, BSP, BSBT, PHCL
    Ph.D. 1987, Johns Hopkins Univ.
    Structure and mechanism in gene regulation; biophysical and structural studies of protein-nucleic acid and protein-protein complexes in chromatin and bacterial pathogenesis.
  - **Cramer, Scott D., Professor***
    Pharmacology, CANB, MSTP, PHCL
    Ph.D. 1992, Univ. of California, Santa Cruz
    The molecular dissection of signaling pathways in prostatic cells, the identification of prostate progenitor or stem cells, and understanding epithelial-stromal interactions in normal and abnormal ductal morphogenesis.
  - **Eisenmesser, Elan Z., Associate Professor***
    Biochemistry and Molecular Genetics, PHCL, MOLB, STBB, MSTP, BSP
    Ph.D. 1998, Purdue Univ.
    Viral protein/host protein interactions, enzyme dynamics, and ligand/receptor interactions involved in cancer progression
  - **Jones, David N. M., Associate Professor***
    Pharmacology, MOLB, MSTP, STBB, BSP
    Ph.D. 1989, Univ. of Cambridge
    Molecular mechanism of alcohols and anesthetic actions; structure and function of biomolecules; NMR spectroscopy, x-ray crystallography, biophysics and molecular biology
  - **Port, J. David, Professor***
    Medicine, Division of Cardiology, Pharmacology and Biophysics, MSTP, BSP, PHCL
    Ph.D. 1989, Univ. of Utah
    G-protein linked receptors and their regulation, regulation of mRNA stability.
  - **Proenza, Catherine, Associate Professor***

Physiology, PHCL, NRSC, IPHYS, MSTP, PHSL, BMSC
Ph.D. 1999, Colorado State Univ.
Molecular and Cellular basis for pacemaking and regulation of pacemaking by the autonomic nervous system

LEGEND:
Institutions:
NJMRC = National Jewish Medical Research Center
*****no longer taking student

Appendix 9: Expectations for Pharmacology Training Program Students

Roughly 1.2% of the US population has earned a Ph.D. At the end of your graduate training, you will have earned a Ph.D., not necessarily because you are smarter than 98.8% of the population, but because you have decided of your own volition to dedicate a significant part of your life to pursue the highest academic achievement of being an expert in your field of research. Accordingly, Graduate School is not a job – it is training to develop you as a scientist with the highest standards in research, ethics, and independent thought. It is also assumed that there is an overarching obligation to yourself and to others that are investing in your career, to pursue this endeavor with the utmost commitment, integrity, and dedication.

The primary expectation of each student admitted into the CU Anschutz Medical Campus Pharmacology and Molecular Medicine Training Program (PharMM) is that they take full advantage of all CU Anschutz resources and couple that with personal responsibility, a dedication to excellence, and positively contributing to the research community to achieve personal and professional success. There are clear and tangible academic and research milestones that every PharMM student must meet over the course of the student's graduate career. It is expected that students will obtain passing grades (B or better) in all coursework, successfully complete at least three research rotations, pass the PharMM preliminary exam, pass the major seminar, and pass the PharMM comprehensive exam. After completion of these milestones before the end of the student's third year, the student has earned the status of a Ph.D. candidate. Subsequent milestones include meeting with your training advisory committee (TAC) every 6 months, publishing at least one first author, peer-reviewed manuscript, and successfully complete and defend a Ph.D. thesis. These are minimum requirements, and the combination of the mentor and TAC determines when a student is ready to defend their thesis work. It is expected that students will make reasonable academic progress throughout their thesis work, which is defined and evaluated by their mentor and TAC. It is also expected that students attend and participate in all PharMM events, such as seminars, student update talks, recruitment events, retreat, and the PharMM student research day. The thesis mentor, TAC, and PharMM leadership provide support, scientific and professional guidance, but ultimately it is the student's self-motivation, intellectual drive, hard work, professional communication, integrity, and effective coordination of their schedules and program requirements that allow them to successfully complete and defend their Ph.D. thesis. The TAC will consist of faculty members within and outside of the PharMM with a composition that provides expertise in the topic areas of the thesis. It is the student's responsibility to utilize the thesis advisor and TAC to lead a successful graduate experience and career. Ultimately, the student determines their own success!

The Pharmacology and Molecular Medicine Ph.D. Training Program has the following expectations for a student's graduate career:

1. A student should be highly self-motivated. Motivation should be intrinsic and not be determined by the mentor or arbitrary deadlines.

2. A student should work the necessary hours in the lab to complete the necessary experiments. What is necessary is determined by the mentor, student, and TAC. Graduate school is not a five-day-a-week, 9-5 job. Expectations as a full-time student as defined by the NIH, NRSA mechanism is: "Full-time is generally defined as devoting at least 40 hours per week to research training activities, or as specified by the awardee institution in accordance with its own policies." With reasonable exceptions, the effort that students put in will be reflected in their success and the timetable for their graduation.

3. A student should be intellectually engaged in their research project. The project should be developed in coordination with, but not at the sole direction of the thesis mentor. The comprehensive exam will be written

by the student. The student may seek advice and discuss the proposal with the mentor and peers, but the proposal document should be the product of the student, not anyone else.

4. As thesis years progress, the student should assume increasing control in the execution and direction of their research project. Also, students should seek advice and mentorship from their peers throughout their graduate career and the student should assume a greater role as a peer mentor in later years.

5. A student must take initiative for their career and be accountable for successes and failures in their research. If things are not working in the lab, the student should coordinate with the mentor and/or their TAC to find a solution. The TAC is independent of the mentor and is in place to ensure progress to a successful thesis defense. This committee is another place to seek advice and solutions. Your PharMM colleagues are yet another great source of mentorship and counsel. Finally, PharMM leadership, including Office of Research Education resources, are in place to address any issues that arise, but the student must be proactive.

6. A student must adhere to PharMM policies, codes of conduct, and expectations as outlined in the PharMM training handbook. This includes the University Student Code of Conduct and Academic Honestly policy (see Academic Honestly section). This also includes the attendance policies for classes, journal club, seminars, and monthly program lunches (see Attendance Policy section). The student should also expect that the mentor is abiding by the PharMM policies and expectations. If the mentor is not upholding their end of the graduate student-mentor agreement, then the student should proactively reach out to the Program Director(s) to address any issues. A student-mentor agreement is best structured in the form of an Individual Development Plan (IDP).

7. Students must be good citizens within the research community at the University of Colorado Anschutz Medical Campus, which includes, but is not limited to, replying to PharMM program emails and requests, notifying the appropriate individuals of travel or time off (including sick leave, vacation, bereavement, paternity leave, leave of absence (personal or medical)), attending scheduled meetings and notifying the other party if a meeting will be missed or if you will be late, showing up on time (before the scheduled meeting time) and being ready to begin the meeting on time, engaging in PharMM activities, treating colleagues with kindness and empathy, holding yourself and your peers accountable to commitments made, expecting and performing to achieve excellence, maintaining the highest standards for academic integrity, and taking ownership of your own successes and failures.

Appendix 10: Disciplinary Actions

The University of Colorado Anschutz Medical Campus, consistent with most other educational institutions, has a student honor code. The Pharmacology and Molecular Medicine Ph.D. Training Program endorses and enforces this Academic Honor Code. The Academic Honor Code is found on the Office of Research Education website; all students are required to read the Academic Honor Code. Violations of the Academic Honor Code will be handled as detailed in the Academic Honor Code itself and may entail disciplinary action, up to and including dismissal from the Program and from the Office of Research Education.

Each student is expected to maintain satisfactory academic progress. Students must maintain a 3.0 GPA. Courses with a grade of B- or lower do not count towards comprehensive exam or thesis credits. It is at the discretion of the Program Directors, Course Directors and GTC to determine the course of remediation on a case-by-case basis. This can include, but is not limited to, a make-up exam, a written essay, or retaking the course. Students who fail to receive a passing grade in Receptors and Cell Signaling (PHCL7606) or Principles

of Pharmacology (PHCL7620) may not be permitted to take the PharMM Preliminary Examination. Failure to address academic deficiencies within the timeframe established by the PharMM GTC will be considered as a failure to progress and will result in the dismissal from the program.

If a student receives a non-passing grade for a course, they are free to appeal grades in PHCL7606 and PHCL7620. PharMM has established the following protocol to provide an unbiased appeals process. It is the student's responsibility to contact, in writing, the Course Director(s) within 5 business days of receiving their final score/grade and provide solid and compelling evidence to support why a change in grade is deserved. The Course Directors will evaluate the appeal and offer their perspective and rationale. The document will then be reviewed by a non-PharMM faculty who has previous experience as a course director. This non-PharMM faculty will provide their recommendation to the GTC. The GTC will evaluate the appeals document and provide a decision. A final decision will be made within 10 business days of receiving the formal appeal from the student.

The student requirements described in this handbook must be met by the deadlines stated. The Program Administrator will monitor the progress of each student. If a student is not meeting the Program's requirements in a timely manner, the Program Directors may request a meeting with that student. After review, the Program Directors may take any actions deemed appropriate, including placing conditions on the student's continuance in the Program or dismissing the student from the Program.
A dismissal from the program requires the approval of the Program Directors, the Graduate Training Committee (Majority Vote), and the Office of Research Education (working with faculty counsel). A program dismissal is a final decision, subject to the items discussed above. A student has the right to appeal the dismissal. This dismissal decision letter will be shared with the Graduate School pursuant to Section 4 of the Graduate School's Academic Appeals Process. The decision is subject to appeal to the Dean of the Graduate School pursuant to the Academic Grievance Process in Section 5 and the Section titled "Written Appeal Process" whereby the student must submit a written response to the to the Dean of the Graduate School (GS.Dean@cuanschutz.edu) within 1 week of receiving the written notice of dismissal.

Appendix 11: Important Dates and Deadlines

FIRST-YEAR STUDENTS

1) First Rotation: August 25 – November 14, 2025
   - Pre-rotation Form for first rotation due on August 29, 2025, by 5 PM
   - Rotation Talk for first rotation: November 17, 2025
2) Second Rotation: November 17 – February 20, 2026
   - Pre-rotation Form for second rotation due on November 21, 2025, by 5 PM
   - Rotation Talk for second rotation: February 23, 2026
3) Third Rotation: February 23 – May 15, 2026
   - Pre-rotation paper for third rotation due on February 27, 2026, by 5 PM
   - Rotation Talk for third rotation: May 18, 2026
4) Preliminary Examination – two-day examination is usually held in mid-June. The actual date will be released on or around min-May.
5) Join Thesis Laboratory – anytime after May 15, 2026, but no later than July 1, 2026.

SECOND-YEAR STUDENTS

1) Major Seminar – Scheduled between late April through early May, refer to the seminar schedule sent out in the beginning of the Fall semester.

- GTC must approve the topic of the Major Seminar one month prior to the seminar date; late March through early April.

2) Submit and get approval of proposed Comprehensive Examination Committee by Program Directors by March 1, 2026
3) Application for Candidacy form and a Request for Scheduling Exam forms need to be completed at least FOUR WEEKS prior to the scheduled Comprehensive Examination
4) Comprehensive Examination has to be completed by September 7, 2026.
   - Please refer to "Examinations and Evaluations" for details on format, expectations and deadlines for the Comprehensive Exam.

THIRD-YEAR STUDENTS

1) Submit and get approval of proposed Thesis Advisory Committee by Program Directors by December 15, 2025.
2) Schedule 1st Thesis Advisory Committee Meeting by April 1, 2026.
3) Please refer to "Thesis Advisory Committee" for details on format, expectations and deadlines for the TAC meetings

FOURTH-YEAR STUDENTS & BEYOND

1) Schedule annual Thesis Advisory Committee Meeting – has to be scheduled no later than six months after previous TAC meeting. The Thesis Advisory Committee can recommend a shorter timeframe for hold a TAC meeting.
2) Please refer to handbook under Thesis Advisory Committee for details on format, expectations and deadlines for the TAC meetings

DISSERTATION DEFENSE

1) The dissertation defense and graduation deadlines are available here, along with instructions for submitting the written thesis using ProQuest.
2) Please refer to handbook under The Doctor of Philosophy Dissertation for details on format, expectations and deadlines for the dissertation defense

The **ACADEMIC CALENDAR** for **2025-26** is available here.

Appendix 12: Pharmacology Comprehensive Exam Checklist

The Comprehensive Exam must be done before Labor Day

Item	Item source	Deadline	Where to get help	Sample for 8/1 comps	For my (exam date) date: Fillable
Set exam date, request committee	Pharm handbook/PD gives an overview at student monthly meeting	~3 months before your desired date	PA, PI, PD, other students	May 1st - send list of requested committee members (5-7 internal, 2-3 external) to PA and PD with date ranges	

Specific Aims page (1pg)	Pharm handbook/draft in grants class	8 weeks before	PI, other pharm students, committee chair	June 1st – **revised final version** to committee	
Fillable comprehensive exam form (outlines research proposal)	Email from PA	8 weeks before (send to PA, goes to the program)	PA, PI	June 1st – fill this out once you finish your aims page (it's okay if the aims change)	
Request for exam (formal record of exam schedule and committee members)	Email PA the following information: Advisor, Co-Advisor, Thesis Chair's name and email	4 weeks before (PA to initiate the documents in DocSign)	PA, PI	July 1st	
Application for candidacy (required for Graduate School records to allow you to be eligible for comps. This deadline is not flexible!)	Email PA the following information: Advisor, Co-Advisor, Thesis Chair's name and email	4 weeks before send to PA to review & fix any errors If **REVISED, CORRECT version** is not submitted to **graduate school** 2 weeks before comps date you will have to reschedule.	PA, PI	July 1st July 15th - MUST be received by Graduate School 2 weeks before comps date	
Full written proposal (8 pg). Get feedback on your grant before submitting!	Written based on specific aims page (use example F31 grants from grant writing class as a template).	4 weeks before to get feedback If **REVISED, FINAL version** is not submitted to committee 2 weeks before comps you will have to reschedule.	Committee chair, committee members, other pharm students. PI can help with experimental design but is supposed to provide minimal feedback on the writing.	July 1st – send committee chair, etc for feedback **July 15th -REVISED version must be received 2 weeks before comps date**	
Practice talk	(Lab meeting, departmental seminar, informal peer practice talks)	1-2 weeks before comps	Your PI is allowed to help with the presentation	July 21st-25th	
Comps exam	30-40min talk, general Q&A, then 1-2 hours oral defense with committee only	Arrive early to set up! Have a backup presentation loaded somewhere	PI, committee chair, other students	August 1st	

<u>Sample timeline for August 1st presentation</u>

May 1st (~3 months prior)

- ❑ <u>Send exam request info to Porgram Admininistrator (PA) and Program Director (PD)</u> (REQUIRED)

  A 2-week window when you want your exam (Aug 1-5, Aug 8-12)
  A list of 5-7 internal (Pharm) faculty and 2-3 external (non-Pharm) faculty you want on your committee.

Discuss with your PI and other students as needed.
Make sure your dates are far enough ahead for ~5 busy faculty members to find mutual free time to schedule your exam.

June 1st (8 weeks prior)

- ❑ Submit your SA page to your committee, PD and PA(REQUIRED, BUT TIMING IS ~FLEXIBLE)

  See handbook for full rules, but this will be drafted in fall grant writing class.
  Ask your PI, other pharm students, etc. to help revise/adapt for comps project.
  Schedule one-on-one meetings with your committee members to get feedback.
- ❑ Submit your fillable comprehensive exam form to PA, PD, PI (REQUIRED)

  This is based on your SA page, it's okay if the proposal changes slightly from what you put on this form. Complete and sign it and return to PA.

July 1st (4 weeks prior)

- ❑ Submit Exam Request to PA(REQUIRED)

  This is a formal record of exam schedule and committee members, it's very brief.
  Exam Request – PA will initiate the document via DocuSign.
- ❑ Submit application for candidacy to PA(REQUIRED)

  This form is required for Graduate School records to allow you to be eligible for comps.
  Application for Candidacy – PA will initiate the document via DocuSign.
  If REVISED, CORRECT version is not submitted to graduate school 2 weeks before comps date then you will have to reschedule.
- ❑ Submit full written proposal (10-12pg) to committee chair, etc. for feedback (STRONGLY RECCOMENDED)

  Get feedback on your grant before submitting the final! Submit a draft 4 weeks ahead to have time to revise before the final deadline.
  This will be written based on your specific aims page. You can use example F31 grants from grant writing class as a template. Ask other pharm students for feedback as well.

July 15th (2 weeks prior)

- ❑ Submit **REVISED, FINAL version** of written proposal to committee 2 weeks before comps date. If you miss this deadline or your committee chair feels that your proposal is not well-developed enough, you will have to reschedule your exam. (REQUIRED)
- ❑ Schedule a practice presentation with defense-style questioning (lab meeting, departmental seminar, informal peer practice talks). Reach out to the Student Life Committee for help scheduling this. (STRONGLY RECOMMENDED)

August 1st

Arrive early to set up. Have backups of your slides just in case. Good luck!!!

Appendix 13: Travel Awards

Students in the Pharmacology Training Program are eligible to apply for a travel award to defray part of the costs of travel to one national meeting during the year. It is appropriate that, in addition, students apply for whatever travel awards might be available from the scientific society or entity organizing the meeting they

wish to attend (e.g., SfN, AACR, Keystone, Gordon Conference, etc.). As a condition of attendance, students are expected to present their work (poster or oral) at any meetings which they attend

- **Hirs Travel Fellowship**

  This is the first "go-to" source for scientific meeting travel subsidization. The **C. Werner and Kitty Hirs Graduate Student Enrichment Fund Awards** may be used for the following purposes:

  1. Travel awards to supplement support for Ph.D. Students to attend national meetings,
  2. Travel awards to facilitate Ph.D. Students learning new techniques either through a visit to an out-of-state laboratory or by signing up for a hands-on technique course, such as an MBL course, or Cold Spring Harbor course.

  The travel awards can be made for up to $500 each. In accordance with Dr. Kitty Hirs' expressed wishes, the travel award for meeting attendance will be divided into two parts: $400 to be applied to travel expenses (e.g., registration, lodging, travel) and $100 directly to the student for personal expenses at the meeting (e.g., making it possible for the student to attend extra-meeting social events in which science is part of the conversation). Up to 20 "meeting" awards will be made each academic year. The travel awards for visiting another laboratory or attending a techniques course are to be applied only to travel expenses (e.g., travel and lodging). Up to 10 "techniques" awards will be made each academic year.

  To Apply: Please follow this link and you can download the application under Travel Awards. Please email the completed form to Dr. Jen Richer and Katie Wennerstrom, in the Graduate School office.

- **Dunwiddie Student Travel Award**

The Dunwiddie Fellowship Award provides funds for travel for students working in the area of neuropharmacology. Any student in a neuroscience focused lab within the Department of Pharmacology may apply for this award. The Fellowship is intended to be used to cover, at least in part, the costs of tuition, fees, and travel for scientific courses such as those offered at Cold Spring Harbor or Woods Hole, or for attendance at various other advanced courses or meetings (i.e., Gordon or Keystone Conferences) where attendance is subject to a competitive selection process undertaken by the course or meeting organizers. The Fellowship cannot be used to support attendance at large society meetings, such as the Annual Meeting of the Society for Neuroscience.

This award may only be received ONCE during a student's Graduate School tenure.

A student must:

1. Be presenting material that is related to neuropharmacology
2. Provide a copy of the related abstract to the GTC indicating that the student is the 1st and presenting author.
3. Write a paragraph justifying why the travel award is beneficial to his or her career
4. Pursue any other funding sources available (if, for instance, the meeting organizers offer any travel awards)
5. Demonstrate commensurate academic merit (subject to the discretionary review of the GTC)

To Apply: Application material should be submitted to the PharMM Program Directors, Jason Aoto (Jason.aoto@cuanschutz.edu) and/or Jim Costello (james.costello@cuanschutz.edu), and the PharMM Administrator, Vanessa Medina (vanessa.medina@cuanschutz.edu).

- **Pharmacology T32 Training Program**

Students funded by the Pharmacology and Molecular Medicine T32 training grant are eligible for $300 in travel support while supported by the training grant. Training opportunities, such as workshops, and conferences are eligible for support.

To Apply: Application material, including a justification for the travel support, should be submitted to the PharMM Program Directors, Jason Aoto (Jason.aoto@cuanschutz.edu) and/or Jim Costello (james.costello@cuanschutz.edu), and the PharMM Administrator, Vanessa Medina (vanessa.medina@cuanschutz.edu)

Appendix 14: Attendance Policy

Students in their 2nd and 3rd years are required to attend Journal Club (PHCL7602). A student is permitted 2 excused absences per year but must produce a thorough written discussion of the paper discussed in the missed session to be turned into the course director.

Attendance at PharMM Program Seminars, including student update talks, Major Seminars, Comprehensive Exams, and Thesis Defense is mandatory for predoctoral fellows in their 1st-3rd years.

Attendance at monthly PharMM Program lunches is mandatory for all students. Absences must be excused by the program directors. Excused absences include but are not limited to attendance at scientific conferences, illness, unexpected care for, or illness of dependents. Calendar invites will be sent, so poor planning on your part is not a reasonable excuse.

Appendix 15: Academic Honesty

Students should adhere to the highest standards of academic honesty and integrity, to include completing individual work as assigned, adhering to department requirements, accurately documenting sources of information and records, and engaging in personal conduct both on and off campus that reflects well on the University, your professional duties, and your ability to perform in classroom and/or laboratory environments. Examples of behavior that violates these standards include: plagiarism (including the undocumented use of internet and web-based information), cheating, illegitimate possession and/or use of examinations, violation of the ethical standards for conducting research, and falsification of official records.

Professional Conduct

As current and/or future professionals, students are expected to adhere to the highest standards of professionalism during their academic career. This means that students adhere to the professional and ethical standards of their respective fields, and the academic and honor code expectations for the University of Colorado Graduate School. The University of Colorado Graduate School has a commitment to accepting a diverse culture and highly values multiple perspectives. This means that not only is discrimination of any form unacceptable, but the University upholds the expectation that students remain open-minded and respectfully discuss and interact with diverse backgrounds and perspectives.

Examples of unprofessional conduct include misrepresentation of effort, credentials, or achievement in either the academic or professional setting; any action which compromises the quality or safety of consumer

care; violation of confidentiality; and any other conduct unbefitting a professional practitioner or researcher. When conducting research, individuals need to comply with research guidelines established by the IRB.

Although it is not possible to list every situation that violates the Academic Integrity Expectations of the Graduate School at University of Colorado Denver and Anschutz Medical Campus, the following examples will provide a reference point:

- Academic Dishonesty
- Complicity with Academic Dishonesty
- Plagiarism
- Cheating
- Fabrication and Falsification
- Submission of the same papers more than once or for different classes
- Misuse of Academic Materials
- Any conduct, both on and off campus, that interferes with the student's ability to perform his/her classroom, laboratory, or professional duties or reflects poorly on the University
- Violation of any University of Colorado, Anschutz Medical Campus, Denver Campus, or Graduate School policy

Appendix 16: Forms

- Committee Meeting Form (Comprehensive Exam Committee & Thesis Advisory Committee Meetings)
- Major Seminar Proposal
- University Comprehensive Examination Grant Proposal Topic
- Thesis Proposal

University of Colorado Denver | Anschutz Medical Campus
Pharmacology Training Program

Committee Meeting Form

Student Name _____

Year Started Graduate School _____

Year Started Thesis Project _____

Year Of Comprehensive Exam _____

Meeting Date _____

Committee Members (Note Chair):

_____

_____

_____

_____

_____

Thesis Mentor _____

Project Title _____

_____

Hypothesis: _____

_____

_____

_____

_____

Specific Aims: _____

_____

_____

_____

Committee Meeting Form, p. 1 of 2

Summary Of Progress Since Last Meeting (organize by aims, as appropriate; discuss any changes in direction; include response to any major critiques from last meeting, areas for discussion and any agenda items)

Manuscripts: Type And Status (primary/review; in prep, submitted, under review, in revision, in press)

Meetings, Abstracts And Form Of Presentation (poster/talk)

Fellowships/ Grants (funding agency, name and dates of grant, title of project, total direct costs)

Other Experience, Accomplishments *(Use additional pages as needed)*

Individual Development Plan (IDP: https://myidp.sciencecareers.org should be updated on an annual basis (at least) and included here for every committee meeting).

Committee Meeting Form, p. 2 of 2

University of Colorado Denver | Anschutz Medical Campus
Pharmacology Training Program

Major Seminar Proposal

Student Name _____

Signature _____

Advisor _____

Signature _____

Project Title _____

_____

Date of Major Seminar _____

Please describe the nature of the seminar (Attach extra pages if necessary.)

_____

_____

_____

_____

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_____

_____

_____

_____

_____

_____

_____
Graduate Training Committee Signature

Major Seminar Proposal, p. 1 of 1

University of Colorado Denver | Anschutz Medical Campus
Pharmacology Training Program

University Comprehensive Examination Grant Proposal Topic

Student Name _____

Signature _____

Thesis Advisor _____

Signature _____

Planned Thesis Topic _____

_____

Grant Proposal Title _____

_____

Laboratory Rotation Work and Advisors

1) _____

_____

2) _____

_____

3) _____

_____

Please give a brief description of the grant proposal topic and list specific aims: _____

_____

_____

Overall Hypothesis: _____

_____

_____

_____

_____

Specific Aim I: _____

_____

Hypothesis:

Approach to Problem:

Specific Aim II:

Hypothesis:

Approach to Problem:

(Add more paper if necessary)

Statement on Data Reproducibility and Rigor:

Date:

Time: _____

Place: _____

_____
Graduate Training Program Director Signature

Suggested Examining Committee Members: Outside Members: _____

_____

Respective Contributions [1]

Describe the collaborative process between you and your sponsor/co-sponsor in the development, review, and editing of this research training plan. Do not include the respective roles in accomplishing the proposed research.

_____

_____

_____

_____

_____

Student Signature

_____

Thesis Advisor Signature

_____

Comprehensive Examination Grant Proposal, p. 3 of 3

_____

University of Colorado Denver | Anschutz Medical Campus
Pharmacology Training Program

Thesis Proposal

Thesis Title _____

Student Name _____

Signature _____

Advisor _____

Signature _____

Date _____

Advisory Committee Members: _____

_____

Brief Summary of Thesis Topic: _____

_____

_____

_____

Brief Summary of Research Plan: _____

_____

_____

_____

Specific Aims: _____

_____

_____

_____

_____

Graduate Training Program Director Signature

Thesis Proposal Summary, p. 1 of 1