

Pharmacology Ph.D. Training Program

Graduate Student Handbook 2023-2024



PROGRAM AT THE UNIVERSITY OF COLORADO ANSCHUTZ MEDICAL CAMPUS

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



Disclaimer for
Pharmacology Ph.D. Training Program
Student Handbook

This handbook does not constitute a contract with the University of Colorado Anschutz Medical Campus Graduate School, either expressed or implied. The Pharmacology Ph.D. Training Program reserves the right at any time to change, delete, or add to any of the provisions at its sole discretion. Furthermore, the provisions of this document are designed by the Pharmacology Program to serve as firm guidelines rather than absolute rules, and exceptions may be made on the basis of extenuating circumstances.

Additional policies described within the handbook are the minimum standards, policies, and procedures from the Graduate School.

2023-2024 PHARMACOLOGY REQUIREMENTS CHECKLIST

First Year Students

FALL SEMESTER begins Monday, August 28th, 2023

- ⊙ Frontiers in Pharmacology PHCL 7600 August 22nd, 2023, 3:00pm-4:30pm
- ⊙ Core Course I, BMSC7806..... M-F, 8:00am – 10:00am
- ⊙ Core Course II, BMSC7810 M-F, 8:00am – 10:00am
- ⊙ Intro. to Research PHCL 7650.001 fall rotation 1 hour: August 28 - November 17, 2023
- ⊙ Intro. to Research PHCL 7650.002 winter rotation 1 hour: November 21, 2023 - February 24, 2023
- ⊙ Winter Pre-rotational laboratory proposal.....2 weeks prior to beginning of second rotation
- ⊙ Seminar Series – Monday at noonMonday, 12:00pm

WINTER ROTATIONbegins Monday, November 21, 2023

- ⊙ Spring Pre-Rotational laboratory proposal2 weeks prior to beginning of Spring semester

SPRING SEMESTERbegins Monday, January 22nd, 2023

- ⊙ Principles of Pharmacology PHCL 7620.....MWF, 9:00am – 11:00am
- ⊙ Receptors and Cell Signaling PHCL 7606TR, 8:30am – 10:30am
- ⊙ Intro. to Research PHCL 7650.001 spring rotation 1 hour: February 26th – May 17th , 2023

SUMMER SEMESTER..... begins Monday, June 3rd, 2023

- ⊙ Preliminary Examination..... June, dates TBD, 2023
- ⊙ Petition for Colorado Residency if not a resident by mid-August 2023

Second Year Students

FALL SEMESTER begins Monday, August 29th, 2023

- ⊙ Statistics for Basic Sciences BIOS 6606..... MW, 10:30-11:50am
- ⊙ Ethics in Research PHCL 7605 W, 4:00pm – 5:00pm
- ⊙ Thesis Laboratory PHCL 8990 Fall research 5 hours
- ⊙ Elective (min. 2 hours, either fall or spring; consult with mentor)..... Fall semester registration
- ⊙ Journal Club PHCL 7613.....2nd and 4th Fridays, 12:00pm

SPRING SEMESTERbegins Monday, January 22nd, 2023

- ⊙ Thesis Laboratory PHCL 8990 Spring research 5 hours
- ⊙ Rigor and Reproducibility in Biomedical Research MOLB/PHCL 7801 Spring research 1 hour
- ⊙ Major Seminar Proposal to GTC..... 4 weeks prior to the seminar presentation date
- ⊙ Elective (not required if completed in fall) Spring semester registration
- ⊙ Major Seminar April 10th & April 17th, 2023
- ⊙ Prepare for Comprehensive Examination
- ⊙ **Petition for Admission to Ph.D. Candidacy**min. 2 weeks prior to the comprehensive examination date

SUMMER SEMESTER..... begins Monday, June 5th, 2023

- ⊙ Thesis Laboratory PHCL 8990 Summer research 1 hour
- ⊙ Comprehensive Examination..... by the end of August 2023*

*If your comprehensive exam needs to be scheduled later than August, check with the Program Director.

Third Year Students and above

FALL / SPRING / SUMMER SEMESTERS

- ⊙ Thesis Laboratory PHCL 8990 Fall research 5 hours
- ⊙ Thesis Proposal Seminar (3rd years)about 6 months after Comprehensive Exam
Please try to plan to hold your seminar in an available Monday presentation slot (see the seminar schedule in the Graduate Training Office). If no convenient slot is available, speak with the Graduate Training Coordinator about alternative days.

Pharmacology Training Program Curriculum & Training Plan

Year 1	Fall	Winter	Spring	Summer
Weekly Seminar Series (Faculty seminars, trainee updates, trainee exams)				
	Rotation 1 & <i>public presentation</i>	Rotation 2 & <i>public presentation</i>	Rotation 3 & <i>public presentation</i>	<i>Preliminary Exam</i> Enter Thesis Lab
	Core Course		Principles of Pharmacology	
	Frontiers in Pharmacology	Receptors & Cell Signaling		
Year 2	Fall	Winter	Spring	Summer
Weekly Seminar Series (Faculty seminars, trainee updates, trainee exams)				
Thesis Laboratory Hours (6 month thesis committee meetings)				
Journal Club				
	Responsible Conduct of Research		Rigor in Research	<i>Comprehensive Exam</i>
	Biostatistics		Elective (if needed)	
	Grant Proposals in Pharmacology		<i>Major Seminar</i>	
	Elective			
Year 3	Fall	Winter	Spring	Summer
Weekly Seminar Series (Faculty seminars, trainee updates, trainee exams)				
Thesis Laboratory Hours (6 month thesis committee meetings)				
Journal Club				
Year 4+	Fall	Winter	Spring	Summer
Weekly Seminar Series (Faculty seminars, trainee updates, trainee exams)				
Thesis Laboratory Hours (6 month thesis committee meetings)				
<i>Thesis Defense after first-authored manuscript and thesis committee approval</i>				

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 and dedication.

The primary expectation of each student admitted into the CU Anschutz Medical Campus Pharmacology Training Program (PTP) 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 PTP 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 PTP preliminary exam, pass the major seminar, and pass the PTP comprehensive exam. After completion of these milestones before the end of the student's third year, the student is then considered 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 PTP events, such as seminars, student update talks, recruitment events, and graduate research day. The thesis mentor, TAC, and PTP leadership provide support, scientific and professional guidance, but ultimately it is the student's self-motivation, intellectual drive, hard work, professional communication, 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 PTP 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!

Expectations for Ph.D. Training

The PTP has the following expectations for a student's thesis years:

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 PTP colleagues are yet another great source of mentorship and counsel. Finally, PTP 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 PTP policies, codes of conduct, and expectations as outlined in the PTP training handbook. This includes the attendance policies for classes, journal club, seminars, and monthly program lunches (see "Attendance Policy" section for details). The student should also expect that the mentor is abiding by the PTP 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 PTP program emails and requests, notifying the appropriate individuals of travel or time off, engaging in PTP 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 success.

Members of the Pharmacology Training Program

GRADUATE TRAINING COMMITTEE

Jim Costello, Ph.D.	Chair, Associate Professor
Jason Aoto, Ph.D.	Chair, Associate Professor
J. David Port, Ph.D.	Professor
Mair E. A. Churchill, Ph.D.	Professor
Mark L. Dell'Acqua, 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

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, Assistant 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., Associate Professor

Pediatrics, Neurology, PHCL MSTP, NRSC

M.D./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.

Caino, M. Cecilia, Assistant 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.

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.

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.

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.

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

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, PhD, 2010 University of New Mexico School of Medicine

Restoration of Hippocampal Function Following Global Ischemia in the Developing Brain

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.

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

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

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

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

Biomedical Informatics, BSP, PHCL, CPBS
Ph.D., 2009, Dartmouth College

Open science, machine learning, and the transcriptome

Heasley, Lynn E., Professor

Craniofacial Biology, PHCL, CANB, MSTP, BSP
Ph.D., 1985, Univ. of California, San Diego

Investigating the role of MAP kinases and specific receptor tyrosine kinases in normal and transformed growth of lung epithelial cells using techniques of molecular and cell biology in lung epithelial cells and human lung cancer cell lines

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

Jordan, Craig T., Professor

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, Assistant 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.

Owens, Philip, Assistant Professor

Pathology, PHCL, CANB

Ph.D., 2008, Oregon Health & Science University

The role of BMP signaling in tumor-induced bone disease; The role of BMP signaling in tumor-associated lymphatics; the role of BMP signaling in tumor-associated myeloid cells.

Petrache, Irina, Professor

Medicine, PHCL

M.D., 1992, Carol Davila University of Medicine and Pharmacy

Pathogenesis of chronic obstructive pulmonary diseases and discovery of targets for therapy

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

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.

Schweppe, Rebecca E., Associate 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, Assistant 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.

Song, Kunhua, Associate Professor

Medicine, Division of Cardiology, CSDV, BSP, MSTP, PHCL
Ph.D., 2007, Univ. of Texas Southwestern Medical Center
Stem cell biology and regenerative medicine for cardiovascular diseases

Sucharov, Carmen, Professor

Medicine/Cardiology, PHCL, CRD, MSTP, IPHY
PhD, 1997, Universidade Federal do Rio de Janeiro
Translational and molecular research focused on children with heart disease.

Todorovic, Slobodan, Professor

Anesthesiology, PHCL, MSTP, NRSC, BMSC
M.D., 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

Tsai, Ming-Feng, Assistant Professor

Physiology and Biophysics, PHCL, STBB
Ph.D., 2010, Univ. of Missouri
Molecular mechanisms, pathophysiological functions, and drug development of mitochondrial membrane transport proteins

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
M.D., 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.

Zheng, Hongjin, Associate Professor

Biochemistry and Molecular Genetics, PHCL, BMSC, STBB
Ph.D., 2009, Univ. of Washington, Seattle
Understanding molecular mechanisms of disease-related membrane proteins.

LEGEND:

Institutions:

NJMRC = National Jewish Medical Research Center

UCDHSC/UCD = University of Colorado Denver Health Sciences Center/School of Medicine

*no longer taking students

Programs:

BIOS = Biostatistics Program

BMGN = Biochemistry and Molecular Genetics Program

BMST = Biomolecular Structure Program

BSP = Biomedical Sciences Umbrella Program

CANB = Cancer Biology Program

CPBS= Computational Bioscience Program

HMGGP = Human Medical Genetics Program

IMMU = Immunology Program

MICB = Microbiology Program

MOLB = Molecular Biology Program

MSTP = Medical Scientist Training Program

NRSC = Neuroscience Program

PHCL = Pharmacology Program

PHSC = Pharmaceutical Sciences Program

PHSL = Physiology and Biophysics Program

RPSC = Reproductive Sciences Program

SOP = School of Pharmacy

DEPARTMENT OF PHARMACOLOGY STAFF

Austin Kovac 4-3619 Health and Safety, Procurement and Travel
Kaite O’Leary, 4-3562 Grants/PreAward
Stephanie Baker, 4-3562 Director of Finance and Administration
Matthew Witt, 4-3561 LAN Manager, Syllabus, Online Courses
Jennifer Orsund, 4-3286 HR/Faculty Affairs
TBD, 4-3560 Payroll Manager, Grants/PostAward

GRADUATE SCHOOL STAFF

Jennifer Richer, Ph.D., Dean303 724 2911
Carol Hadd, Executive Assistant to the Dean 303 724 2911
Teresa Bauer-Sogi, Program Manager for Admissions and Student Progress Coordinator.....303 724 2918
Pat Goggans, Program Administrator, and Events Coordinator303 724 5878
Bruce Mandt, Ph.D., Associate Dean and Director of Postdoctoral Office303 724 2930
Kristine Sikora, Ph.D., Associate Dean and Director of Recruitment303 315 5879
Madison Parker, Academic Services Coordinator.....303 724 9555
Kathryn Wennerstrom, Director of Finance and Administration303 724 2917

OFFICE OF RESEARCH EDUCATION

Program Administrator..... 303-724-3565
Angeles Ribera, Ph. D, Associate Dean of Research Education303 724 4517
Andy Bradford, Ph.D., Assistant Dean of Student Affairs.303 724 3507
Jodi Cropper, Business Services Program Director303 724 9644
Jared Vazquez, Manager303 724 3120
Steve Frazier, Business Services Senior Professional303 724 3468

OTHER IMPORTANT NUMBERS

Student Assistance Office 303 724 7684, Education II North, Room 3204
Student Health Insurance/Services..... 303 724 7674, Education II North, Room 3207
Registrar’s Office..... 303 724 8059, Education II North, Room 3123
Ombudsman’s Office 303 724 2950, Building 500, Room C7005

**ADDITIONAL DEPARTMENTAL AND PHARMACOLOGY TRAINING PROGRAM
COMMITTEES**

The final list of 2023 committee chairs and members will be announced in the Fall of 2022.

Student Admissions & Recruiting Committee

*Kate Smith
WonChan Oh
Fabrice Dabertrand
Tim Lahm

Student Representatives: (changes every year)

Seminar Series Committee

*Aoto, Jason

Chandra Tucker

**denotes committee chair*

Priorities for the First Few Weeks

Both the CU Anschutz Medical Campus Graduate School and the Pharmacology Ph.D. Training Programs schedule orientation sessions to help students through their first few days on campus. In addition, the Graduate School will require each new student to complete an online orientation session. 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 to 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. 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.

The following details are especially important to each new student.

- Establish a checking account as soon as possible.
 - The University issues all paychecks, including student stipends, as automatic deposits. Students should be sure to have a "voided" check available when filling out payroll forms. Each student is required to produce a driver's license (or state ID) and a social security card for payroll purposes.
- New students must immediately obtain documentation to support the Petition for State Residency.
 - First-year students must make collecting this documentation a priority. Funding will be available, assuming satisfactory academic progress, only if the student qualifies as an in-state resident after the first year of study. A detailed list of the necessary documents is contained in *Appendix A*.
- Each person on campus must carry a CU picture ID.
 - This ID serves many purposes, including enabling students to access the laboratory areas on the Anschutz Medical Campus and the library, to obtain parking, and to attend special University functions. After arriving on campus, student identification photographs will be taken. If you arrive prior to orientation, the Department badging official and/or the Graduate Training Coordinator will assist you in arranging for an appointment with the ID Access Office.
- Announcements/Communications.
 - Please be sure to note the announcements posted on the several bulletin boards located outside of the Graduate Training office, the Pharmacology Administrative offices and the Lounges.

- Email is the primary form of written communication both within the Department and the University as a whole. Please check your email regularly: **as a minimum, twice a day.**
- First-year students are provided access to the Graduate Student Retreat upon their arrival.
 - Each student is entitled to use the Graduate Student Retreat through successful completion of the Preliminary Examination. After completion of the Preliminary Examination, each student should be assigned a space in his or her thesis advisor's laboratory.
- **When setting up your first laboratory rotation, please be sure to choose a mentor whose laboratory is located on the Anschutz Medical Campus.** While there are many varied Training Faculty members, located throughout the several affiliated campuses, experience has taught us that students new to the program have a full schedule, and adding commuting to another campus only has a negative impact on the new student's performance.
 - Third, or (under certain circumstances) second rotations may be done with mentors on other campuses.

GRADUATE STUDENT FINANCIAL SUPPORT

For first-year graduate students, stipend (currently \$37,000 per year), tuition, and (individual) health insurance benefits are generally supported by the Dean of the AMC Graduate School. Upon successful completion of the Preliminary Exam at the end of year one, and upon identification and acceptance into a thesis laboratory, on a competitive basis, the Pharmacology Training Program supports selected students on an NIH National Research Service Award Training Grant (T32). Other second-year students are supported by funds provided by their mentors and/or by other external sources (i.e., fellowships and awards). Following the University Comprehensive Examination (generally at the end of the student's second year), the annual stipend during the thesis years is provided either by the student's thesis advisor, the Training Grant (on a competitive basis), or by external fellowships. **Continuation of support is predicated at all times on satisfactory academic progress, as determined by the mentor, the thesis advisory committee, and the Graduate Training Committee. The financial obligation for a student does not rest with the Department of Pharmacology or the Program.** Each student is responsible for their own books, housing, and any other expenses not specifically mentioned above. The Graduate Training Coordinator will obtain a copy of the students' bills following registration for the current semester. The Training Coordinator will ensure that all appropriate charges on the student bills are paid. It is only necessary to deliver a copy of the student bill to the Graduate Training Office if there is a problem or question. Each student is personally responsible for late fees and fines, so it is critical that all necessary paperwork arrives at the Graduate Training office in a timely fashion and that all necessary registrations are completed timely. Moreover, students registering past the semester registration deadline set by the office of Admissions & Records are assessed a \$60 late registration fee, which is also the student's responsibility by explicit policy of the Assistant Dean of the Graduate School.

Policy on Outside Employment (Adapted from the CU conflict of interest and commitment and NIH policies):

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. 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. Students must remain in **good academic standing** in order to continue their external employment. Students receiving extramural support for their Ph.D. from training grants or other sources are subject to the requirements and policies of those funding entities and may not be eligible for external employment. Failure to disclose external employment, falsely reporting, or willfully exceeding approved hours will be grounds for disciplinary action and possible dismissal from the PhD program.

Student expenses, including the stipend, will be paid by the sources detailed above until graduation as long as the following conditions are met:

1. Maintaining satisfactory academic progress (*see p.19, Preliminary Examination*)
2. Achieving eligibility for in-state tuition after the first year.
 - a. Students who fail to qualify for in-state residency will be responsible for the difference between in-state and out-of-state tuition.
3. Passing the Preliminary Examination at the end of the first year.
 - a. This requirement applies both to students who may be matriculating directly into the Pharmacology Degree Program and to students from the Biomedical Sciences Program (BSP) who intend to enter the Pharmacology Ph.D. Training Program
4. Completing the University Comprehensive Examination on or about the end of the second academic year.
 - a. Students accepted into the Program as second-year degree candidates must pass the Comprehensive Examination at the end of their first year within the Program.
5. Ability of the student's chosen thesis advisor to provide support during the research phase of the Program.
6. Scheduling the Thesis Defense within approximately five years of entering the Program.
 - a. Graduate School rules generally require that a student defend their Ph.D. within seven years of matriculation. Extending thesis time past the start of year 8 requires graduate school approval.
 - b. The NIH generally limits pre-doctoral support to seven years total.

CONTINUED FINANCIAL SUPPORT INFORMATION

TRAVEL FUNDS FOR STUDENTS*

***(SUBJECT TO CURRENT COVID RESTRICTIONS)**

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 most obvious and 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.

Other travel funds:

Department of Pharmacology Student Travel Award:

The GTC may award up to four \$750 awards each year, and a log will be kept of students receiving these awards. Individual students may receive this award once during their graduate tenure.

Conditions:

A student must:

1. Have a thesis mentor that has a **primary appointment in the Department of Pharmacology**
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)

Dunwiddie Travel Fellowship:

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. See GTC Travel Award for rules on how to apply. This award may only be received **ONCE** during a student’s graduate school tenure.

Pharmacology Training Program:

Depending on funds available to the Program from the Graduate School, funds may be available on a competitive basis to any 2nd year or above graduate student in the Pharmacology Graduate Training Program. If funds are available in any given year, the GTC will announce the format for application. Individual students may receive this award more than once during their graduate tenure, but, only once per academic calendar year.

AVAILABLE CAMPUS RESOURCES TO ADDRESS FOOD/FINANCIAL INSECURITIES AND WELLNESS:

Food Insecurities

The food pantry is open to all faculty, staff and students seeking food, hygiene items and pet supplies. There are no restrictions on the number of items that can be taken or limits on food pantry visits. It is open 24/7. For information (location, how to access), please visit: cuanschutz.edu/student/support/student-food-pantry

Financial Insecurities

To combat unexpected financial insecurities, there are three resources on campus:

1. CU Anschutz Shares (<https://www.cuanschutz.edu/student/support/cu-anschutz-shares>)
Eligibility Guidelines (See website for full details)
 - To be eligible for consideration, a student:
 - Must be experiencing an unanticipated situation (accidents, food insecurity, natural disasters, homelessness, etc.)
 - Must be currently enrolled and regularly attending at least one course at the CU Anschutz Campus
 - Can provide sufficient documentation of current need
 - Must exhaust all other possible financial resources (student loans, Medicaid, personal financial accounts, family/friends, etc.) before applying for student emergency funds
2. ORE Student Emergency Relief Fund – up to \$1500.00
(<https://app.smartsheet.com/b/form/b2b49d9089054c268bf2690d1c9cf0a9>)

Eligibility (See website for full details)

- Students must be enrolled in a ORE Basic Science PhD program. Please note students may only receive assistance from this emergency fund twice during their tenure.
 - Before applying for emergency funds, students are encouraged to speak with their Program Directors and Financial Aid. These individuals may be able to help identify alternate sources of financial assistance and/or provide useful advice.
3. Department of Pharmacology Emergency Funds
 - *In progress: The Department of Pharmacology is establishing emergency funds to support students who are in the laboratories of faculty with a primary appointment in the Department of Pharmacology. We encourage students to first seek emergency funds through the University and ORE before applying for Department emergency funds.*

Mental Health/Support

Overview of Campus Mental Health Resources: (<https://www.cuanschutz.edu/mental-health-resources>)

Need to speak to a mental health professional?

(<https://medschool.cuanschutz.edu/psychiatry/programs/student-resident-mental-health>)

Virtual Mental Health resources

(<https://www.cuanschutz.edu/student/support/TelusHealthStudentSupport>)

Dialectic behavior therapy (DBT) Skills Group:

This group introduces participants to a variety of skills, including mindfulness, distress tolerance, emotional regulation, and interpersonal effectiveness.

Meetings: The group meets once a week for 13 weeks on Tuesday, 5:30-6:30.

Please email Danielle.Sukenik@cuanschutz.edu to register by setting up a phone consultation

Attention-deficit/hyperactivity disorder (ADHD) Skills Based Group:

This group provides students and residents with strategies to minimize the impact of attention problems while they pursue their academic and career goals.

Meetings: Fridays, 12 noon - 1 p.m., Fitzsimons Building, Rm. E2305 (2nd floor, east hallway).

Contact Dr. Rosenthal at 303-724-9637 to schedule a screening for this group.

Obsessive compulsive disorder (OCD) Support Group:

This group will have a cognitive behavioral focus format:

- The Question (discussion of a topic related to OCD)
- Goal Planning (members set a goal to accomplish during the next week).

Meetings: Mondays, 12 noon - 1:30 p.m., Fitzsimons Building, Rm. E2305 (2nd floor, east hallway).

Contact Rachel Davis, MD if interested: Call 303-724-4716 or email Dr. Davis to RSVP and verify insurance coverage.

"Insights" - group psychotherapy for students:

Group psychotherapy is a weekly group intended to promote self-awareness of how one manages emotional situations and identifying relational patterns. "Insights" group is a relatively unstructured group in which members of the group will perform the majority of talking, while the facilitators moderate when needed. The group can complement individual therapy or serve as the main treatment.

Contact Noa Heiman if interested: Noa.Heiman@ucdenver.edu 303-724-8109

Graduate Student Support Group:

Graduate school can be hard, come talk about it! Introducing the graduate student support group, exclusive to individuals enrolled in a PhD program. Come process your experiences, meet some colleagues, and snag a free muffin with your coffee.

Meetings: Thursday mornings at 8 am Fitzsimons Building, Room #E2305 (2nd floor, east hallway).

Contact John Whittier if interested: John.Whittier@ucdenver.edu

Interpersonal Violence

Phoenix Center (<https://www.cuanschutz.edu/student/support/phoenix-center>)

Office of Disability, Access and Inclusivity

<https://www.cuanschutz.edu/offices/office-of-disability-access-and-inclusion>

Diversity, Equity and Inclusion:

Central Office of Diversity, Equity, Inclusion and Community Engagement (ODEICE); <https://www.cuanschutz.edu/offices/diversity-equity-inclusion-community>

School of Medicine Office of DEI (<https://medschool.cuanschutz.edu/deans-office/diversity-inclusion>)

List of Additional Campus Resources:

Office of Case Management

Advocating for student needs – Resource connection – Care team management

(303) 724 – 8488 / holly.nelson@cuanschutz.edu / Refer a student: www.ucdenver.edu/Anschutz/care

Office of Student Health Promotion

Email Health.Promotion@cuanschutz.edu to get involved and submit ideas!

Integrated Transgender program

Provides medical, surgical, and mental health support to transgendered individuals. Anschutz Outpatient Pavilion, 1635 Aurora Court, 6th Floor Aurora, CO 80045 720.848.2650 UCHITP@uchealth.org

State, National, and Emergency Support

Well-being Support Line (for Healthcare Workforce in Colorado) 303-724-2500

Accepts calls and texts. Staffed by trained volunteers from AMC and UC Denver with backup from licensed mental health professionals. Can facilitate referrals to longer term treatment (UCHealth Virtual Behavioral Health) if needed

Colorado Crisis Services

1-844-493-8255

Text "TALK" to 38255

<http://coloradocrisisservices.org/>

National Suicide Prevention Hotline

1-800-273-TALK (8255) <https://suicidepreventionlifeline.org/chat>

Curriculum

The Pharmacology Ph.D. Training Program attempts to allow for individual flexibility while providing a common core experience for every student. The required courses are listed in the next section. Each student is encouraged to choose electives that match his or her interests. Each student not in the MST Program must do three research rotations, each in a different laboratory. In addition to course requirements, second-year students must also fulfill the Major Seminar requirement during the spring semester.

Students must receive a minimum of a 'B' in all required courses. Any grade less than a B, will require a retake of the course.

REQUIRED COURSES

RESEARCH ROTATIONS

Introduction to Research in Pharmacology

Fall – PHCL 7650.001 – 1.0 CR

Directed laboratory research in an area selected by the faculty. Students are required take three rotations lasting one academic “quarter” each, starting in the fall semester of their first year.

Introduction to Research in Pharmacology

Winter – PHCL 7650.002 – 1.0 CR

Directed laboratory research in an area selected by the faculty. Students are required take three rotations lasting one academic “quarter” each, starting late in the fall semester of their first year.

Introduction to Research in Pharmacology

Spring – PHCL 7650.001 – 1.0 CR

Directed laboratory research in an area selected by the faculty. Students are required take three rotations lasting one academic “quarter” each, starting in the spring semester of their first year.

Research rotations are designed to introduce students to research methodologies, to teach approaches to scientific problem solving, and to provide the opportunity to explore various laboratories as potential homes for thesis research. Students should approach the research rotations with the primary goal of identifying their future thesis advisors. Research rotations also provide students with the opportunity to accumulate a variety of different research experiences.

The proposed rotation plan, a two-page formally written paper, must be submitted to the Graduate Training Committee at least two weeks prior to the start of the rotation to ensure that the proposal is appropriate (*see Appendix C*). An individual faculty member cannot have more than one Pharmacology student doing a research rotation in his or her laboratory at any given time.

There are several considerations which a student should keep in mind when choosing a rotation advisor. Rotations must be performed with a member of the Departmental Training Faculty (*see p.7*). It is the student’s responsibility to take the initiative to contact a rotation advisor and arrive at an agreement with the advisor in a timely manner.

At the completion of each required rotation, students must present a post-rotational seminar. This seminar will be presented on a predetermined Monday during the regular Departmental Seminar Series. The actual dates of the post-rotational seminar series for any given year are available from the Graduate Training Coordinator. In the post-rotational seminar, the student presents the rationale, methods, and results obtained from the rotation project, as well as an interpretation and a discussion of the rotation project

results. The post-rotational presentation usually lasts fifteen to twenty minutes, with the last five minutes customarily devoted to questions from the audience.

ROTATION GRADES

Each rotation is assigned a letter grade. The rotation advisor assigns the initial grade following the post-rotational seminar. Based upon subsequent faculty input, the grade for the seminar may be adjusted up or down by one-half grade.

Each student (with the exception of students entering from the BSP or MST Programs) must complete at least three research rotations by the end of the first program year. Failure to do so will result in dismissal from the program. The possibility of a fourth rotation during the summer quarter between first and second year will be considered for students unable to decide upon a thesis advisor after three rotations.

Fall - Begin First Research Rotation

Frontiers in Pharmacology – PHCL 7600 – 1.0 CR

Dr. Nidia Quillinan, nidia.quillinan@cuanschutz.edu

This course introduces beginning graduate students to cutting-edge research topics in Pharmacology. The lectures are designed to be accessible to beginning doctoral students, and student discussion is strongly encouraged. Topics change yearly.

Introduction to Research in Pharmacology – PHCL 7650.001 – 1.0 CR

Directed laboratory research in selected area by the faculty. Students are required take three rotations lasting one academic quarter each, starting in the fall quarter of their first year.

Introduction to Research in Pharmacology – PHCL 7650.002 – 1.0 CR

Directed laboratory research in selected area by the faculty. Students' third research rotation.

Biomedical Sciences Core Course

BMSC 7806 and 7810

Time: 8:00 – 10:00 a.m., M-F

Credit Hrs: 8 to 10 credits

Place: To Be Announced

BMSC 7806 – M-F 8am-10am – 6 credits

Offered August 24 to October 30th

Course will focus on the fundamental principles of biomedical sciences. Lectures and recitations/discussions will primarily address the basics of molecular biology, biochemistry, genetics, cell biology, and energetic principles.

BMSC 7810 – MTWR 8am-10am – 2 to 4 credits.

Offered November 2 to November 19 and November 20 to December 11

Sections focus on different core topics in biomedical science and will address subject areas such as protein structure and function, neurobiology, embryology, stem cell research, and cancer biology. Student can enroll in multiple Core Topic Courses topics in one semester.

Core Course Objectives/Organization

This is an interdisciplinary course required for first year graduate students enrolled in basic science Ph.D. programs at UCD|AMC. The objective of the course is to provide the basic science information and introduction to the skills required for a successful research career in all disciplines of modern biomedical

sciences. Topics cover the fundamentals of biochemistry, molecular biology, cell biology, developmental biology, molecular genetics and biomolecular structure. Specialty topics required by individual programs are taken usually during the Spring semester of the first year, and in some cases in the second year to round out the curriculum.

Administrative Assistant/Office of the Dean of the Graduate School

ORE is the contact for the BMSC Core Courses. Please contact ORE (som-ore@cuanschutz.edu) for administrative matters including problems downloading course documents.

Biomedical Sciences Core Course	Course Information	Credits
Foundations in Biomedical Sciences IDPT 7806	Foundations in Biomedical Sciences	6
Core Topics A in Biomedical Sciences IDPT 7810 (then appropriate section)	Held for 3 weeks-starting in November	1 to 2
Core Topics B in Biomedical Sciences IDPT 7810 (the appropriate section)	Held last 3 weeks of the semester starting after Thanksgiving	1 to 2

Total Fall Semester Hours 12 to 14 CR

Winter - Begin Second Research Rotation (~after Thanksgiving Break)

Spring – Begin Third Research Rotation

Receptors and Cell Signaling – PHCL 7606 – 3.0 CR

Director: Dr. Fabrice Dabertrand, fabrice.dabertrand@cuanschutz.edu

Co-Director: Dr. Matthew Sikora, matthew.sikora@cuanschutz.edu

Prereq. IDPT 7806-09

This course presents an in-depth treatment of the role of receptors and signal transduction systems in the regulation of overall cell function and growth. The course consists of both didactic lectures by faculty members and extensive student-led discussions and evaluations of current literature. Topics include: signaling coupled to seven-transmembrane receptors; heterotrimeric and small GTP binding proteins; phosphatidylinositol and other phospholipid-derived second messenger signaling; signaling via ligand-initiated calcium fluxes; serine-threonine proteins kinases; tyrosine protein kinases and growth factor receptor signaling; transforming growth factor, activin and NF Kappa b; intracellular targeting; steroid receptor structure and function; signaling pathways to apoptosis.

Principles of Pharmacology – PHCL 7620 – 6.0 CR

Dr. WonChan Oh, wonchan.oh@cuanschutz.edu; Dr. Josh Black, joshua.c.black@cuanschutz.edu

This course will focus on an in-depth analysis of the basic principles of pharmacology (structure/activity of drugs, dose/response principles and specificity of action) and will analyze the mechanisms by which drugs produce their therapeutic effects. Medications to be covered include autonomic and central nervous systems drugs, cardiovascular drugs, anti-cancer drugs, antibiotics and antivirals, anti-inflammatory, immunosuppressive drugs, and drugs of abuse (addictive drugs).

Introduction to Research in Pharmacology – PHCL 7650.001 – 1.0 CR

Directed laboratory research in selected area by the faculty. Students' third research rotation.

Total Spring Semester Hours	10.0 CR
Total Year-One Semester Hours	24.0 CR

PRELIMINARY EXAMINATION

Date TBD (generally mid-June), ~4-5 weeks after the spring semester ends. All first-year students taking these classes will take the Preliminary Exam.

At the end of the first year of study, each student will be given a two-day written examination on a broad range of topics related to the first-year's course work. A 70% average is required in order to pass this Preliminary Examination. In the case of a failing grade, it is solely the option of the Program to allow a student to retake the entire examination or a portion thereof. Alternatively, the Program may elect to terminate the student's matriculation. (*see p.19, Preliminary Examination*)

YEAR 2 SCHEDULE

Fall

Statistical Methods in Pharmacology – PHCL 7609 (Register for cross-listed BIOS 6606) – 3.0 CR

TBD

An introduction to basic statistical methods utilized to analyze scientific data. The goal of this course is to provide students in the biological and health sciences with the knowledge and skills necessary to analyze and interpret data, which is essential for communicating scientific results. Students will gain experience in analyzing datasets with and without a statistical software package, interpreting results, and critically reviewing statistical methods presented in publications.

Ethics in Research – PHCL 7605 – 1.0 CR

Dr. Gidon Felsen, 303 724 4532

This course is designed to introduce students to issues around ethics of research, publication, and reviewing of manuscripts and grants. Lectures and discussions of the history of scientific fraud, examples from recent cases, examples of ethical dilemmas, and consequences of fraud will be covered.

Pharmacology Journal Club – PCHL 7613 – 1.0 CR – (Pass/Fail)

Dr. David Port, david.port@cuanschutz.edu

The overall goal of the course is to teach the students to read and discuss current literature in their field and to gain a comprehensive view of the directions that lead to high-impact research. Each student will be

responsible for selection and presentation of a paper from a high-impact journal. All students are expected to have read the paper and will be prepared to discuss any figure in the paper.

Optional: Grant Proposals in Pharmacology – PHCL 7615 – 1 CR

Dr. Ulli Bayer, ulli.bayer@cuanschultz.edu

Dr. Jason Aoto, jason.aoto@cuanschultz.edu

Learn principles of good grants(wo)manship and hone our skills in homework assignments and discussions. Our goal is to enable a better learning experience during the writing of the comprehensive exam proposal, by gaining the tools for optimized self-assessment. Thus, this class will be most useful for students that have already passed their prelims but have not yet prepared their comps proposal. As the flavors of research in Pharmacology are quite diverse, this class is also well suited for students from other programs. The course consists of lectures, discussion/workshop sessions, and homework. There will be no exams or tests. Homework assignments will include reading material, critiquing grant proposals, and researching funding sources.

Elective

Second year students must register for an elective to fulfill the **30 credit minimum** required to take the Comprehensive Exam at the end of their second year. It is recommended that each student coordinate with their mentor and the Graduate Program Director to select the best course. **The elective courses must be at least 2 CR and be taken for a letter grade (i.e., not P/F).** Due to intermittent course availability and the constant addition of new options, the elective can be taken either in the fall or spring semester. *See Appendix A for a list of example electives.*

Total Fall Semester Hours

up to 4.0 CR + Elective

SPRING

Rigor and Reproducibility in Biomedical Research – MOLB/PHCL 7801 – 1 CR – (Pass/Fail)

Dr. Steve Anderson steve.anderson@cuanschultz.edu

Beginning in the Spring of 2017, all Pharmacology (and Molecular Biology) Program students are required to enroll in this course. This course will include both T32 and non-T32 students. The focus of the course will be on several important areas: Cell line and animal authentication by genotyping and Quality control of Antibodies.

Rigor and Reproducibility resources for comprehensive exams and dissertations:

<http://grants.nih.gov/reproducibility/index.htm>

<https://www.nih.gov/research-training/rigor-reproducibility>

<http://grants.nih.gov/reproducibility/faqs.htm>

Total Spring Semester Hours

Pending Elective

Total Year-Two Semester Hours

up to 4.0 CR + elective hours

Second year students need a minimum of 30 hours to qualify for their Comprehensive Exam

Second year students should also register for a minimum of 5.0 credits of Doctoral Thesis Hours in both the fall and spring semesters.

Fall

Doctoral Thesis Hours PHCL 8990 5.0 CR

Spring

Doctoral Thesis Hours PHCL 8990 5.0 CR

Summer

Doctoral Thesis Hours PHCL 8990 1.0 CR

University Comprehensive Examination (*see p.29*)

Minimum Total hours required:

It is the primary responsibility of the student to keep track of course hours.

- **30 hours of course work for the University Comprehensive Examination (only graded courses, not P/F courses count towards the 30 hours)**
- **30 thesis hours to defend a Thesis**
- Pharmacology students accumulate ~24 total hours, including Research Rotations, during the first year and 3 hours in their second year from the required didactic curriculum. Your elective course(s) completes the minimum 30 didactic course hour requirement for the Comprehensive Exam.
- Register for Fall and Spring
- All students beyond their first year must register for one Doctoral Thesis hour each summer (PHCL 8990), unless your position is classified among the 3000 series of job codes. Please see the Graduate Training Coordinator for guidance on this issue.
 - Students making their final thesis defense must register for 5 hours in the semester in which they defend (including summer semester)

EXAMINATIONS

There are two milestone examinations for each graduate student in the Pharmacology Ph.D. Training Program. The first examination, given at the end of the first year, is the departmentally administered **Preliminary Examination**. The second examination, given at the end of the second year, is the University-administered **Comprehensive Examination**. (*see below*). In between the student presents their **Major Seminar**.

The **Preliminary Examination** is a broad-based written examination covering the didactic material presented during the first year's course work. The exact format of the examination, time and number of questions, may change on an annual basis. For students matriculating into the Pharmacology Ph.D. Training Program, a major focus of the examination will be on material presented as a subset of questions based on the Pharmacology Ph.D. Training Program required courses (Principles of Pharmacology, and Receptors and Cell Signaling) which must be answered. Assuming successful completion of the Preliminary Examination requirement, a student may immediately begin work in a thesis laboratory and become eligible to take the University Comprehensive Examination. For a student entering the Pharmacology Ph.D. Training Program from the Biomedical Sciences Program (BSP), the student may choose to take the Pharmacology exam if they have taken the appropriate coursework, or, they may choose to take any other AMC basic science program-administered preliminary exam, under an agreement of reciprocity. Regardless, a passing grade is required in order to be permitted to select a mentor in the Pharmacology Ph.D. Training Program and to begin thesis work within the Program.

The statement below clarifies the Graduate School policy on students who do not pass the preliminary exam. From the Graduate School Rules:

Preliminary Examination

Each Program is responsible for ensuring that students are qualified for doctoral study through a preliminary examination. The results (Pass/Fail) must be reported to the Graduate School. A student who fails the examination is subject to immediate dismissal from the Graduate School upon the recommendation of the program and concurrence of the Dean. At the Program's discretion, a student who fails the examination may retake it once.

In addition to the Graduate Program having the discretion to allow a student to retake the preliminary examination, the Graduate Program has full responsibility for designing the compensatory examination and for determining what constitutes a passing grade. The Assistant Dean of the Graduate School first must be notified that the student did not pass the preliminary exam, and then must be notified whether the student passed the exam on the second attempt.

MAJOR SEMINAR

Each student is required to present a **Major Seminar** during the second year (*see Appendix C*). 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. Prior to the end of spring semester of the second year of study, each student presents a thirty-minute seminar discussing a focused area within the scientific literature. The topic area for this seminar *cannot* be directly related to student's planned thesis project. **The student must select a mentor for their major seminar. They mentor must be a member of the Pharmacology Training Faculty and cannot be their thesis advisor.** The subject of each student's Major Seminar must be approved by the Graduate Training Committee **at least one month prior** to presentation.

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 of the 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 the expert. 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 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.

UNIVERSITY COMPREHENSIVE EXAMINATION

The **University-based Comprehensive Examination** is an orally defended grant proposal taken at or near the end of the second year, or the end of first year of laboratory study, whichever applies (generally the end of third year (end of first lab year) for MSTP students). **Prior to scheduling this examination, the student must have completed all required course work, including the minimum number of elective credit hours, for a total of 30 didactic credit hours (Pass/Fail courses do NOT count towards the 30 hours).** The student must then obtain the Ph.D. Application for Candidacy Forms from the Graduate School office or website. **The forms must be completed and submitted to the Graduate School and the final version of the proposal delivered to all committee members at least two weeks in advance of the scheduled examination date.** The student is reminded that they must be registered for at least one thesis hour (PHCL 8990) during the summer semester in which the examination is taken.

Important documents for the Comprehensive examination:

[Exam Request form](#) – use this form when scheduling a comprehensive examination or defense.

[Application for Admission to Candidacy](#) – this form needs to be submitted with the Comprehensive Exam request form.

The Comprehensive Exam contains three major components:

1. The written grant proposal
2. The grant proposal presentation
3. The oral defense of the proposal

GENERAL GUIDELINES FOR UNIVERSITY COMPREHENSIVE EXAMINATION

OVERVIEW

- The topic may, but need not be, related to the student’s future thesis topic.
- A student must seek approval of the topic from the Chair of the GTC. A student may express a preference for University Comprehensive Examination committee members; however, **the Chair of the GTC determines the ultimate composition of the committee**. The comprehensive exam committee is composed of five members, including at least one committee member (but no more than two) who is external to the Department’s complement of Training Faculty Members. A one-page copy of the specific aims must be distributed personally to the committee members *at least eight to ten full weeks prior* to the defense date or the examination will have to be rescheduled.
- The Graduate School requires 30 credit hours of coursework and the Admission to Candidacy forms to be completed *prior* to taking the University Comprehensive Examination. Completing these requirements is the sole responsibility of the student.
- The Graduate School guidelines stipulate that the University Comprehensive Examination is pass/fail only (*see CLARIFICATION OF GRADUATE SCHOOL RULES FOR EXAMINATION RESULTS below*). By University rules, Comprehensive Examinations are publicly announced. Thus, by definition, this is an “open” examination, that is: open to any and all University of Colorado faculty interested in attending. The examination does not require an audience; however, in several UCD departments, all faculty and students are either required or strongly encouraged to attend the open portion of the examination.

FORMAT FOR PREPARATION OF THE WRITTEN PORTION OF THE COMPREHENSIVE EXAM

1) During the second year of the training program, the Pharmacology graduate student, with extensive guidance from their thesis mentor, identifies a research problem.

Note: This research problem can be within the research area of the intended thesis research, or it can be unrelated. The direction of the project is at the discretion of the student and the advisor.

2) The student, with guidance from the thesis mentor and with the approval of the Chair of the GTC, identifies potential comprehensive exam committee members with expertise relevant to the research problem. The committee will be comprised of 5 total members, at least 3 from the pharmacology training program, and the balance, 1 or 2 faculty members, outside of the training program (a formal list of members/nonmembers, and those with active graduate school appointments, is available from the Dean’s Office). This step should occur in late spring to early summer of the second year. Once the committee is selected, working with the Graduate Program Coordinator, the student and committee

faculty will schedule an exact date and time for the Comprehensive Exam. Acting prospectively will prevent major delays in the exam date due to schedule conflicts and provide a clear timeline for the preparation of the proposal.

Note: Committee members should be made aware of increased responsibilities relative to years past where they simply assembled on the exam day and posed questions related to the written proposal and general/specific knowledge.

3) 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 a NIH R01 grant. This is submitted to members of the Comprehensive Exam committee (hard copy and by email).

4) Within **2 weeks** of receipt of this 1-page document, the committee members will 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 strengthens/weaknesses the Specific Aims. If a majority (4 of 5) of the members approve, the student proceeds 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.

Note: Personal interactions between the student and committee members are encouraged. This is the best way to clearly exchange criticisms and comments. It is possible that specific comments from committee faculty will range widely and, in some cases, be difficult for the student to reconcile. The thesis mentor may provide input on how to best weigh and integrate these critiques.

5) Following approval of the 1-page document, the student prepares (with little or no assistance from the mentor; NIH form for student/mentor respective contribution must be included) the full proposal (10 to 12 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 10- to 12-page limit. The proposal should be sent to the committee for final review a minimum of two weeks prior to the exam date.

6) The student, with assistance from program administration, will have reserved a room for the oral exam, submitted the required paperwork to the Graduate School, sent out an announcement to the Department of Pharmacology about the Comprehensive Exam seminar and prepared a 20- to 30-minute oral presentation of the proposal for the seminar.

Note: Preparation of the comprehensive exam proposal should not be accompanied by a cessation of laboratory research.

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:**
<http://grants.nih.gov/reproducibility/index.htm>
- 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.
- The proposal should be no more than twelve single-spaced typewritten pages (NIH guidelines allow 0.5 inch margins on all sides; font should be Arial or Helvetica), 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 him- or herself with the primary literature related to the topic and be able to summarize succinctly its relevance to his or her own proposal. Reading and understanding approximately thirty papers in the area of interest would be considered reasonable.
- 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 assume 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.

PRESENTATION

- The examination format is generally a thirty-minute 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. At the end of the presentation, the candidate will accept questions from the audience in attendance. Following this public question and answer session, the general audience will be dismissed, and the candidate will be examined by the Comprehensive Exam Committee members.

ORAL DEFENSE

- During the oral defense portion of the exam, faculty members will test the candidate's knowledge **not only regarding the proposal topic but with respect to the discipline of pharmacology as a**

whole. Good performance on this section of the exam is critical to the successful outcome of the exam. The student is advised to be prepared for broad-ranging questions covering virtually any pharmacology-associated topic. Among the several purposes of the exam will be to probe the depth of the candidate's knowledge as well as the student's ability to "think on his or her feet."

- At the conclusion of the oral defense, the candidate will be excused, and the committee will deliberate to determine the result of the examination.

CLARIFICATION OF GRADUATE SCHOOL RULES FOR EXAMINATION RESULTS

(subject to change)

PASS

You must receive the affirmative votes of a majority of the members of the committee in order to pass.

- You will need to pay attention to the rules regarding registration for the correct number of thesis hours in the semester during which you will take the comprehensive exam in order to be eligible for it.

PASS WITH CONDITIONS

The committee may feel that, although you have passed the examination, you should complete additional work. This may be in the form of rewriting submitted work, additional coursework, etc. These conditions must be satisfied within six months. You will be considered to have "passed" when these conditions are met. Failure to meet the conditions will result in failure of the examination.

- You should register for thesis hours as if you had passed without conditions (see the notes under PASS above).

FAIL

In the event that you fail the examination, you are subject to immediate dismissal from the Graduate School. **At the discretion of your program, you may be allowed to retake the examination once.** The remedial exam will be in a form designated by the committee and must be completed within six months.

- You will be required to meet registration requirements for the new examination.

ENTERING A THESIS LABORATORY

Selecting a Thesis Mentor/Advisor

The selection of a thesis advisor is one of the most important decisions a student will make during the course of his or her graduate career. Each student must select a thesis advisor from among the Pharmacology Training Faculty. (*see p.3-6*) An updated list of Training Faculty can be obtained from the Pharmacology Training Program website (www.cuanschutz.edu/pharmphd). The first year of the training program is designed to provide each student with an opportunity to interact with the faculty so that they feel familiar with the faculty members and their respective research interests. The student should know which laboratory they wish to enter or about the date of the Preliminary Examination; however, a thesis advisor may be selected at any time during the first year. Selection of advisors is on a first-come-first-served basis. *A faculty member may have only two Pharmacology graduate students doing thesis research concurrently. Additional Pharmacology graduate students into a thesis laboratory is contingent upon*

approval of the GTC. In the unlikely event that a student is unable to select a thesis advisor prior to the beginning of the Fall semester of the second year of graduate training, the Program reserves the right to dismiss the student from the program.

Selecting a Thesis Advisory Committee (post-comprehensive exam)

After a thesis advisor and project have been chosen, the student and advisor will provide a list of recommended faculty members to the GTC. Three or four faculty members chosen at the discretion of the GTC will constitute the student's preliminary Thesis Advisory Committee (TAC). The student should prepare the Thesis Proposal paperwork (*see Appendix C*) two weeks prior to the seminar presentation date. The proposed recommendation for members of the TAC must be approved by the Program Director. The TAC meets once every six months with the student and his or her thesis advisor to monitor the progress of the project and to provide additional input and suggestions. **The student must take the initiative in scheduling TAC meetings.** After each committee meeting, the student will complete the Thesis Advisory Committee Meeting Summary with his or her TAC chair. This web form must be no later than two weeks following the TAC meeting. If the TAC meeting is accompanied by an annual presentation, then both the presentation and the meeting forms must be completed at <http://predocprogress.cuanschutz.edu>.

Thesis Proposal and Update Seminars

No more than 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. The student's 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 (every 6 months) as well as TAC *mandatory* meetings at least every six months in 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 an outside committee member (*see below*) by the date of the first thesis update (i.e., on or around one year in thesis laboratory). Following each committee meeting, regardless of whether the student gives a public presentation, the student and TAC chair will complete the Thesis Advisory Committee Meeting Summary web form (*see above*).

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.

Prior to scheduling a final defense, each graduate student must publish at least one primary, or first-author (co-first author is acceptable), peer reviewed publication ("in press" is acceptable) based on the student's thesis work. This requirement is NOT met by the publication of a techniques paper, a book chapter, or by an invited review.

NEW: 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>

THE THESIS DEFENSE

As stated previously, the TAC is comprised of three or four faculty members, the membership of which is subject to the approval of the Program Director. Approximately one year prior to the anticipated date of the thesis defense, one or two additional faculty members (for a final total of five) will be added to the TAC and will be present at the final year's update committee meetings preceding the thesis defense. This committee, again subject to the approval of the Program Director, will constitute the Thesis Examination Committee (TEC).

As per Graduate School rules, the TEC shall consist in a minimum of five Graduate Faculty members. At least one of the members must be outside the program's core training faculty. The majority of the members, including the committee chair, must be from the core training faculty of the degree-granting program.

Pharmacology Ph.D. Training Program policy stipulates that the student's advisor cannot be a member of the TAC nor the TEC.

Per Graduate School rules, the Program Director must approve the student's final Thesis Examination Committee membership and the examination schedule. The Graduate School must be notified, using the appropriate forms, *at least two weeks* before the exam. The Graduate School will send announcements of the examination to the appropriate faculty members and the signature form will be sent to the Graduate Training Office to be placed in the student's file for use at the examination. The Graduate Training Coordinator will also post the notice of the examination.

For the defense, the student presents a 30-40-minute seminar highlighting the contributions made to the understanding of a particular scientific problem by his or her dissertation work. The seminar is open to the public and a brief period for questions will follow. Thereafter, everyone attending the public seminar who is not on the student's Thesis Examination Committee will be dismissed. The Committee will then examine the student about the thesis work. In order to pass the examination, the student must receive affirmative votes from the majority of the members of the Thesis Examination Committee. Thesis Examination Committee members, as with the University Comprehensive Examination committees, may impose conditions before conferring a passing evaluation, or may require a more extensive remedies before considering passing the student.

All members of the committee must be present for the examination*. One member, but not the chair nor the student, may participate by interactive video if absolutely necessary. The examination form is signed by each member of the Thesis Examination Committee and returned to the Graduate Training Coordinator. The student must receive votes from the majority of the Examination Committee for one of the following outcomes (*refer to p.24*):

1. Pass
2. Pass with stated conditions
3. Fail

If a student passes the examination with conditions, those conditions *must be satisfied within sixty days* of the defense. Students who matriculated to the Pharmacology Training Program from the Medical Science Training Program (MSTP) have thirty days. The special conditions must be stated on the examination form and subsequently monitored by the committee chair in order to ensure that the conditions can be completed within the sixty days allotted. If a student fails the examination outright, they may, at the discretion of the

examination committee, be allowed to take the exam one additional time within six months of the initial failure. The other option, again, at the discretion of the committee, is to dismiss the student from the program.

*(Under conditions dictated by COVID, exams may be carried out virtually. This is subject to change at any time)

Each student is *required* to give the Department of Pharmacology three copies of the completed thesis on bond paper ready for binding. The bond for those three copies may be obtained from the Graduate Training Office. In addition, an electronic copy of the complete text of the thesis is requested; but, at a minimum, an electronic copy of the thesis abstract is required by the Graduate Training Office. This item should be provided following final acceptance of the manuscript by the Assistant Dean of the Graduate School.

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 Pharmacology Training 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 Pharmacology Training 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.

Leave of Absence Requests

Students who need to leave the Pharmacology Training Program for a period of time (up to one (1) year) should consult with the program directors for guidance on a Leave of Absence (LOA). Personal LOAs are reviewed and approved entirely through the program. Medical LOAs are managed through the CU Anschutz Student Outreach and Support Office in collaboration with the program. An approved LOA pauses the student's academic record and automatically extends the time limit for completing a degree by the equivalent amount of time that the student spends on leave. Requests for LOA that exceed one (1) year may be approved with sufficient justification to the Dean of the Graduate School.

Students who do not return from their approved LOA will be considered to have withdrawn from their program and will either be required to formally re-apply for admission, or, at the discretion of the program, may be re-admitted through an expedited process.

When students take a Leave of Absence, per University Policy, all financial support, including medical insurance coverage, will be suspended until the student returns to active Pharmacology Training Program status. Some arrangements can be made for the student should insurance be necessary for them while on leave. This is determined on a case-by-case situation.

You can find information on the University's policies and procedures on Leave of Absence [HERE](#)

Dismissal and Appeals

As noted in the “Expectations” section of this Student Handbook, there are clear professionalism behaviors and tangible academic and research milestones that every Pharmacology Training Program student must meet in order to remain in good standing as an MSTP student. The Training Program, Directors, and administrators, including SOM leadership will support students through any and all difficulties at any point during both their medical and graduate school years.

Dismissal of a student occurs very rarely. Grounds for dismissal include but are not limited to: poor academic performance; subpar performance in the laboratory rotations; professionalism issues; inability to join a thesis lab after three or at most four rotations due to professionalism issues or poor performance; failing the Preliminary Exam; failing the Comprehensive Exam; poor progress in their PhD Thesis work; or dismissal from their Graduate Program and Graduate School.

Students who the program feels are eligible for dismissal will be asked to meet with the Program Directors, ORE leadership and/or Graduate School Leadership at any point in the program to review their behavior, training progress, and commitment to the program. The student will be given a warning until the program feels the student has remedied their situation.

The Pharmacology Training Program Leadership will schedule regular meetings with the students, as they feel necessary, to continue to review the student’s progress. The student can also schedule meetings with the Directors at any time during this period.

Dismissing a student from the Pharmacology Training Program is done only after very careful review of the student’s behavior, professionalism, academic and research training progress. This review will be conducted by the Program Directors, GTC and faculty mentor(s). If the decision to dismiss is reached, the student will be notified immediately following review. Finally, upon dismissal from the Program, the student will no longer receive financial support (tuition, fees, insurance, or stipend).

Below are some of the grounds for which a student could be dismissed from the Program:

1. Failure to meet expectations (see “Expectations” section)
2. Failure to pass the preliminary exam in the spring of year 3.
3. Subpar performance in the laboratory rotations or the inability to match into a thesis lab due to professionalism issues, poor performance or due to lack of consensus between PI and student that a thesis project could be successfully completed.
4. Failure to pass the Comprehensive Examination. The student’s Graduate Program can dismiss the student from that Program at that point. Dismissal from the Graduate Program results in dismissal from Graduate School and dismissal from MSTP.
5. Poor progress in their PhD thesis work
6. Professional issues or poor academic performance.
7. Other unusual or extreme departures from program requirements, ethical/integrity standards, and professionalism lapses.

Below is the outline of the procedure for Appeal of Dismissal decisions:

During Graduate School/Thesis Years – If dismissal occurs at any point after the student has committed to a graduate program and/or is on a Leave of Absence, appeals regarding the dismissal from their graduate program (and thus from the Graduate School) must be submitted in writing to the Dean of the Graduate School and the Associate Dean of Research Education stipulating the basis for the appeal; with copies to the Graduate Program Directors and the SOM Associate Dean of Students.

APPENDIX A, PHARMACOLOGY PROGRAM ELECTIVES

Check the Graduate School Course Book (available under the “current students” link on the Graduate School website: <http://www.cuanschutz.edu/graduateschool>) for prerequisites and the semester in which each course is offered, if it is still not clear, please confirm with the Chair of the Graduate Training Committee. There are a number of other courses that may be of value for your particular interests, but **electives must be at least 2 credit hours and graded, they cannot be (Pass/Fail)**. Please keep in mind that course availability depends upon several factors and that not all courses are offered every year. Students may check with the course director or the Registrar’s Office for the most current information on course offerings. You may request that a course in which you are interested by counted toward your degree progress even if it does not appear on the list below. With some exceptions, most basic science elective courses can count toward your degree progress. Please contact the Graduate Training Coordinator or Graduate Program Director for more information.

APPENDIX B, Establishing In-State Residency

Establishing In-State Residency

To be awarded in-state tuition status at the beginning of your second year you must establish that you have resided in the state for a year and established several kinds of connections to the state. It is important that these “connections” be established as soon as you arrive in the state to show the one-year history required by the University. Some things that can support these connections are a signed lease or rent receipts, utility bills in your name, a Colorado driver’s license and license plates, and voter registration.

Prior to the start of your second academic year you must fill out *and have notarized* the Petition for In-State tuition classification and submit this along with your supporting documentation to the office of Admissions. Petition forms are available in the Admissions office and *Appendix A* of this handbook. Notaries can be found in the Financial Aid Office, the Chancellor’s office, and the Graduate Nursing office. Failure to complete the In-State tuition classification process could jeopardize your continued financial support in the Department of Pharmacology Training Program.

For driver’s license offices, license plate offices and voter registration please consult the local city phone book.

From the office of Student Records:

UNIVERSITY OF COLORADO Anschutz School of Medicine OFFICE OF ADMISSION AND RECORDS INFORMATION ON HOW TO ESTABLISH DOMICILE (RESIDENCY STATUS) FOR TUITION PURPOSES

The requirements for establishing residency for tuition purposes are defined by Colorado Revised Statutes 23-7-101 et. seq. The statute requires that a person must be domiciled in Colorado twelve (12) consecutive months immediately preceding the registration period for the term in which resident status is

desired. A person's tuition classification status will be determined from the application for admission when the person applies for admission to school. If a person is classified nonresident, then they must wait until eligible for a change in tuition classification and then file a petition for such change. Petition forms are available from the office of Student Admissions and Records, MS1801, and should be filed one or two months before the term begins for which one wishes to qualify. The student is notified of the University's decision by mail before classes begin. This memorandum is designed to explain fully all of the Colorado state residency requirements and to answer the most commonly asked questions. Please read the following material carefully, and only contact the Tuition Classification officer for circumstances not covered in this memorandum. **WARNING: READ THE ENTIRE MEMORANDUM, FOR THERE WILL BE INFORMATION THAT YOU DO NOT REALIZE FROM THE HEADING APPLIES TO YOU.** Example: If you are not 23 years of age, you must read the section on Emancipation.

ESTABLISHING DOMICILE

In order to establish a domicile for tuition purposes, there must be not only **physical presence** within the state AND **demonstrated intent** to make Colorado one's permanent home. Intent includes several kinds of connections with the state, established and dated. When the last necessary connection with the state is dated, the twelve-month waiting period begins, at the end of which the student qualifies for in-state tuition, the change in classification to take effect at the next registration period, never mid-term. There is no formula or checklist to follow in establishing domicile. Generally, physical presence (as shown by rent receipts, leases or statements from landlords) plus one connection with the state will not be sufficient to establish domicile. Several connections are necessary, and the more connections that are made, the more assurance a person has of qualifying for residency. A final determination of status can be made only from a written petition with documentation. The last day to submit petitions for any given term is the last day of late registration. This date is published in the UCD Coursebook (available on the Web at <http://www.cuanschutz.edu/student-services/resources/registrar/students/Courses/Documents/GeneralCoursebook2010-2011.pdf>). The date of the last day of late registration is also the date that is used to determine whether or not a person has been domiciled in Colorado for the requisite twelve months in order to qualify for residency status. This means that persons must move into the state early enough to obtain such things as a Colorado driver's license (or ID card), voter registration, Colorado license plates, employment, etc., by the deadline date. Assume that school starts September 1 each year. If a person moves into Colorado on August 20, 2002, for instance, starts employment on August 28, 2002, obtains a driver's license and license plates on October 20, 2002, and registers to vote in December, 2002, they will not qualify for residency status until January, 2004, because there are not enough connections with the state dated by September 12, 2002 (the date of the last day of late registration) to establish domicile and start the 12-month waiting period. There is only physical presence plus employment. The fact that the person complied with motor vehicle laws by obtaining a driver's license and license plates within the time period required by the motor vehicle laws is of no consequence. There is no provision in the tuition statute for retroactivity of compliance. Compliance cannot be backdated as though driver's license and automobile plates were dated September 12 instead of October 20. However, the statute does provide for noncompliance with motor vehicle statutes to be weighed against the affirmative evidence of domicile that person has in his or her favor. These dates are ironclad dates beyond which the Tuition Classification officer cannot look in determining whether or not a domicile has been definitively established for residency status for any given term. You are cautioned that there is no guarantee that in-state classification can be granted, and further cautioned that retention of ANY out-of-state connections, such as voter registration, creates a negative inference of intent to make Colorado one's permanent home. In addition, the only authorized information regarding residency for tuition purposes comes from the Tuition Classification officer at the University, and the officer is not bound by any misinformation given by other persons. Basically, domicile for tuition purposes has two

parts to it: (1) physical presence within the state, and (2) intent to make Colorado one's true, fixed and permanent home and place of habitation. This intent must be shown by objective evidence of physical connections with the state of Colorado, such as: 1. Driver's license, as governed by the Colorado Motor Vehicle Operator's Licensing Law. 2. Automobile license plates, as governed by the Colorado Motor Vehicle Registration Law. It is your responsibility to be fully informed of your duties under these laws. Noncompliance with these laws establishes a negative presumption of your intent to make Colorado your permanent home and will be weighed against your affirmative evidence of a Colorado domicile. The tuition statute specifically provides for this negative presumption but makes no provision for compliance with these statutes to be a retroactive factor showing your intent to make Colorado your permanent home. This will be explained in more detail further on in this memorandum. If you do not drive in the state, you should nevertheless relinquish your out-of-state driver's license to the Department of Motor Vehicles, for retention of such out-of-state connections likewise works as a negative inference of intent to make Colorado your permanent home. You may obtain from motor vehicle personnel a Colorado ID card for identification purposes. 3. Voter Registration Again, it is your responsibility to be apprised of voter registration laws by contacting the County Clerk for the county in which you reside, if you have any questions. Basically, you may register to vote the day you move into the state. The only time during which you cannot register is 32 days before and 32 days after a November general election. 4. Permanent, full-time, off-campus employment and payment of Colorado State Income Taxes through the filing of a Colorado state income tax return by persons whose income is sufficient to be taxed are considered very highly persuasive evidence of intent to make Colorado one's permanent home. Student employment or temporary work are not considered as persuasive. It is the actual official acceptance of employment that forms the connection with the state. offers of employment before acceptance, registering with an employment agency, or simply looking for a job are not sufficient and are of no import. Acceptance of future employment, such as a student who signs a legally binding contract to go to work for a specific firm upon graduation from school, is persuasive evidence. You are responsible for being fully informed of the Colorado state income tax laws, and you may contact the Colorado Department of Revenue at 303-238-7378 for information. Basically, a person is required by law to pay state income tax to the domiciliary state, and to file state income tax returns at the end of each year if one's income is sufficient to be taxed. You must claim all earnings on your return, even if there were no withholdings or actual paychecks. For instance, payment in cash for musicians or carpenters, etc., is income that must be claimed on the return. In addition, one must file and claim all income, wherever earned, whether earned overseas or in temporary employment in another state during one's domiciliary period in Colorado. Any taxes withheld by or paid to another state will then be credited against taxes due in Colorado. Failure to comply with income tax laws weighs heavily against a person's declared intent to make Colorado one's permanent home. Payment of real estate taxes, in and of itself, is of no legal consequence, since people often own real estate in many different states. 5. Ownership of residential real property in the state, particularly if petitioner resides in the home. Mobile homes are personal property, much like automobiles, and do not fall into the real property category. The connection is formed with the state on the date that the contract for purchase of the property is signed, providing that the contract is eventually followed by a closing date and the sale is consummated. Petitioners should provide documentation of the contract date, as well as of the closing date. 6. Graduation from a Colorado high school. 7. Continued presence in Colorado during periods when not enrolled in college, or during periods between academic sessions. (Failure to reside in Colorado during these periods, however, will not be held against the student.) 8. Any other factor peculiar to the individual which tends to establish the necessary intent to make Colorado one's permanent home, such as a license to practice a profession in Colorado, or orders from a physician to seek out a drier climate for health reasons. Bank accounts, seeking dental or medical care, marrying or divorcing in the state are matters of convenience because one happens to be present in the state, and are not the kinds of

connections with the state that show intent to make Colorado one's permanent home. Leases and rent receipts prove only physical presence and do not qualify as connections with the state.

ANSWERS TO FREQUENTLY ASKED QUESTIONS

1. You do not have to be employed in order to gain in-state tuition status, although employment is one very strong indication of intent to make Colorado your permanent home.
2. You may be enrolled in school and you may live in a dormitory while your twelve-month waiting period is running.
3. There are many different kinds of residency. A person can be a resident for voting purposes, or motor vehicle laws purposes, and still not be a resident for tuition purposes, because each kind of residency is governed by a separate state statute.
4. Because there is no uniform federal legislation governing tuition classification, each state is free to enact its own legislation. The fact that a student does not qualify for residency status in any other state is irrelevant to a determination of one's status in Colorado, because one's status is governed solely by the Colorado statute.
5. A student may leave the state for vacations or for summer work in another state during the twelve-month waiting period and the student does not have to keep an address, a post office box number, or maintain a rented apartment during the absence. The only requirements to keep one's in-state status are to retain the Colorado connections such as a driver's license, license plates and voter registration, and to claim any out-of-state income on one's Colorado state income tax return at the end of the year.
6. Marriage of a nonresident to a resident does not qualify the nonresident for in-state tuition. Colorado has passed a state Equal Rights Amendment to the Colorado Constitution, which means that each person is treated separately and equally. Each person must qualify on your own connections with the state. You may use the marital and spousal situation as some evidence, but the primary evidence will be his or her own state connections.
7. The tuition statute places the burden of proving domicile and qualification squarely on the student, not the Tuition Classification officer.
8. Erroneous classification as a resident due to a mistake of the registering authorities shall be changed and corrected for the subsequent term. In-state tuition is not a right, but a privilege, and person can be changed to nonresident if it is shown that an error was made, and that the student does not qualify.
9. Aliens are legally capable of establishing a domicile when they have been granted the status of lawful permanent resident by the U.S. Immigration and Naturalization Service. The date used is the date the application for permanent visa was accepted, and documentation of this date should be submitted, along with a photocopy of the immigrant card itself.

EMANCIPATED AND UNEMANCIPATED MINORS

A person must be legally emancipated before they can establish a domicile separate from the domicile of the parents. Emancipation for tuition purposes takes place automatically when a person turns twenty-two (*) years of age or marries or commences a post-baccalaureate degree-granting program. Domicile must then be established, and the person must wait twelve months after turning twenty-two (*), or after getting

married, or after commencing a post-baccalaureate degree program before gaining in-state tuition. The following constitutes evidence of emancipation, but no one criterion, taken alone, can be considered conclusive evidence of emancipation.

1. Affidavit from parents (found on the back page of the petition) stating parental relinquishment of any claim or right to the care, custody, and earnings of the minor, as well as of the duty to support the minor, with documentation of the fact that the minor has not been claimed as a tax deduction on income tax returns. (If a minor claims emancipation as of August 1 of a given year, and the parents have supported the minor from January 1 to August 1, the minor may be claimed for that given year, since the parents provided more than half of the support of the minor for that year.) Emancipation under these circumstances is the act of the parent and not of the child. If there is a duty to support the minor, as, for instance, a court order in a divorce decree, there is no emancipation.
2. No financial support provided by the parents, coupled with proof that the minor can independently meet all of his or her own expenses, including the cost of education.
3. Entry into the military service. Persons who are unmarried and under twenty-two (*) years of age who wish to claim emancipated minor status must prove that they are completely self-supporting and financially independent from parents.

The petition forms provide space for the minor to show all of his or her expenses and how these expenses are met. A minor cannot receive loans from parents, nor can a minor receive a gift of money one day and claim to be emancipated the next day. Gifts totaling \$150 to \$200 a year at the most are allowed. The minor cannot be driving a car owned by the parents nor living in a home owned by the parents when the parents are domiciled in another state. Parents cannot carry an emancipated minor on their car or health insurance. Loans co-signed by parents are scrutinized carefully to see that the primary legal obligation of repayment rests squarely upon the minor and not upon the parents. Minors must provide documentation of any such loan agreements, financial aid grants, etc. Trust funds are scrutinized carefully, and the minor must show documentation of when the trust fund was set up, by whom, for what purpose, and the last date that money was put into the fund. The test is always that of whether or not the trust was set up as a means to get around the requirements for emancipation under the tuition statute, and money cannot have been recently deposited into the fund. In other words, the day that every penny that the minor is using to meet all of his or her own expenses has come entirely from his or her own resources is the day that the minor achieves the status of emancipated minor and becomes legally capable of establishing a domicile in Colorado separate from the out-of-state parental domicile. The student must then establish a domicile in Colorado, as outlined earlier, and wait twelve months before qualifying for in-state tuition. If a minor wishes to claim that they have a legal guardian in Colorado, such as a brother or an aunt, it will be necessary to produce a court order granting the guardianship over the person of the minor, and the court will have to certify that the parents do not provide substantial support to the minor. Support of gifts of money from relatives or friends is scrutinized carefully to ensure that the relative or friend is not merely a conduit through which money flows from parent to minor. The parents cannot be paying back the relative or friend. The burden is placed squarely upon the minor to prove emancipation to the satisfaction of the Tuition Classification officer. Unemancipated minors may qualify for in-state tuition only when their parents or parent is domiciled in Colorado. An unemancipated child of divorced or separated parents can be immediately classified as in-state if either parent has been domiciled in Colorado the requisite period of time, regardless of which parent was granted custody or duty to support the minor by court decree. The parent in this instance is always the one to complete the petition for in-state

classification, based on the parent's domicile and connections with the state. (*This age is 21 for students who matriculated at a public Colorado college before September 1, of 1996).

MILITARY SITUATIONS

Active-duty members of the armed forces of the United States on permanent duty station in Colorado and their dependents (as defined by military regulations) are eligible for in-state tuition rates regardless of domicile or length of residence. The member must have reported to a duty station in Colorado, as certified by military command, not later than the first day of class of the applicable academic term. Unless the student meets the requirements for domicile in Colorado for one year as detailed above, this eligibility expires as of the first term which begins after retirement, permanent change of duty station, or loss of dependent status. In the absence of other factors, Colorado domiciliaries who are members of the armed forces do not lose domiciliary status as a result of prolonged absence from Colorado due to military orders. To retain domicile, military personnel must maintain Colorado as their state of legal residence for tax purposes and voter registration during any absence. It is not possible to establish a new domicile in Colorado while residing in another state or while being physically present in the state only on a temporary basis.

CIVILIAN ABSENCES FROM THE STATE

Civilians who accept overseas employment, governmental or otherwise, or temporary employment in another state, or who are temporarily absent from Colorado for other reasons, must continue to file Colorado state income tax returns as residents for each and every year of their absence from the state. They must claim and pay taxes on all of their earnings, wherever earned, and will receive a credit for taxes withheld by or paid to another state. Civilians, like military personnel, are allowed to back file for all years of absence, and refusal to back file is sufficient evidence by itself to determine that the civilian has relinquished, renounced, and abandoned his or her Colorado domicile for tuition purposes. This is so even if the civilian has retained Colorado driver's license, license plates and voter registration.

Updated 8/17/23

APPENDIX C,

Forms

- Pre-rotation Proposal
- Major Seminar Proposal
- University Comprehensive Examination Grant Proposal Topic
- Instructions & Forms for Admission to Ph.D. Candidacy
- Thesis Proposal Summary
- Thesis Approval from Mentor

University of Colorado Denver | Anschutz Medical Campus
Pharmacology Training Program
Pre-Rotation Laboratory Proposal

Student Name _____

Signature _____

Advisor _____

Signature _____

Date _____

Project Title _____

1) Background

2) Hypothesis to be tested

3) Specific Aims

4) Approach to the Problems

Signature of Graduate Training Program Director

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.)

Graduate Training Committee Signature

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

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

THESIS MENTOR APPROVAL

Student Name: _____ Student Number: _____

Title of Thesis:

Mentor approves the forwarding of the thesis draft to the full committee with the following notes:

Proposed Thesis Defense Date: _____

Student signature

Date

_____ Mentor's initials if student has first author, peer reviewed paper (review or methods articles, book chapters, do not satisfy this requirement)

Thesis Approved to Pass Along to Committee (required signatures):

Student Mentor

Date

Student Thesis Committee Chair

Date

Degree-Granting Program - Chair or Director

Date

Distribution:

Original to Program Student File

Copy to Student

Copy to Student Mentor

Copy to Thesis Committee Chair

*Thesis approval from the mentor must be given within three days of receipt of the thesis draft. The draft must be given no later than two weeks prior to defense date. _____