



THE UNIVERSITY OF ARIZONA

**College of Pharmacy**

Graduate Programs

# **GRADUATE STUDENT HANDBOOK**

## **2021-2022**

### **PHARMACOLOGY & TOXICOLOGY (PHARMTOX)**

### **GRADUATE PROGRAM TRACK**

## **PHARMACOLOGY & TOXICOLOGY Ph.D. DEGREE**

This handbook outlines the philosophy and requirements of the Graduate Degrees offered in the disciplines of Pharmacology and Toxicology at The University of Arizona. It is intended to be used as a tool to understand the requirements for obtaining a graduate degree. This handbook should be used in conjunction with the current Graduate College website. The requirements of the Graduate Program in Pharmacology and Toxicology outlined herein are under the authority and consistent with the rules and guidelines set forth by the Graduate College of the University. Some of the curricular requirements in this handbook exceed those stated in the Graduate College website. Students must meet the more stringent requirements contained in this handbook. Certain general University regulations and specific Pharmacology and Toxicology Program degree requirements are only outlined in this document; consult the current Graduate College website for complete details (<https://grad.arizona.edu/new-and-current-students>).

Attainment of a graduate degree in Pharmacology and Toxicology requires outstanding scholarship and demonstration of distinguished research leading to a thesis/dissertation that contributes significantly to the general fund of knowledge in the discipline. The degrees are never granted solely as certification of faithful performance of a prescribed program of studies. All degree requirements must be fulfilled. Therefore, the requirements for these degrees are also outlined in this Handbook.

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## 1.0 INTRODUCTION

The graduate program in Pharmacology and Toxicology has courses of study leading to the Doctor of Philosophy and Master of Science degree in Pharmacology and Toxicology. Well-funded research opportunities and the strong multidisciplinary nature of the program provide students with a highly interactive approach to research and education in pharmacology and toxicology.

### **M.S. degree in Pharmacology and Toxicology**

The Pharmacology and Toxicology Graduate Program **does not admit students with the expressed interest in pursuing the M.S. degree.** For a variety of reasons, students admitted to the Ph.D. Program may complete an M.S. degree in lieu of a Ph.D. degree. These reasons may range from unsatisfactory academic performance in the Ph.D. program to a desire to make a course correction in career path. The overall expectations for these students are similar to those for students in the Pharmacology and Toxicology Ph.D. program.

### **Ph.D. Degree in Pharmacology and Toxicology**

The objective of the Ph.D. track in Pharmacology and Toxicology is to impart advanced scientific knowledge in pharmacology and toxicology, to provide training opportunities in conducting state-of-the-art approaches in basic research in pharmacology and toxicology, and closely related subdisciplines, in order to prepare the students for careers in independent research or related careers in academia, industry or government. The average time to graduation is less than five years.

## 1.1 BACKGROUND

Pharmacology and Toxicology are allied scientific disciplines concerned with investigations of the physiological and biochemical actions of endogenous compounds and xenobiotics on living tissues. These studies range in scope from investigations at the molecular level to clinical pharmacological and toxicological responses in humans. The ability of pharmacologists to elucidate basic mechanisms of drug action in living cells and biological systems has permitted the development of a rational approach to drug design and use. In addition, pharmacologists and toxicologists study compounds to gain a better understanding of the molecular mechanisms of toxicity.

In the last three decades there have been rapid advances in the fields of pharmacology and toxicology, characterized by basic and clinical achievements which have made a profound impact on society. Fundamental discoveries have led to the introduction of a large number of highly effective and relatively safer pharmacologic agents. A number of acute and chronic diseases previously disabling to a large number of people can now be modified or controlled by drug therapy. The field of toxicology has been heavily influenced by the increasing need for safety evaluations of drugs and chemicals and by a greater appreciation for the hazards resulting from chemical contamination of the environment. Pharmacologists and toxicologists also study the adverse effects of drugs to better understand their physiological and biochemical outcomes.

The realm of pharmacology and toxicology over the years has widened from one of purely basic science to a central and critical position of a team which addresses basic and applied research and health care problems. The pharmacologist has a role in the discovery or investigation of chemicals which have some useful biological activities. Toxicologists and pharmacologists now occupy a prominent role in the larger translation of drug use to humans for therapeutic and/or diagnostic use. In the future they are likely to become involved in the activities of health promotion and disease prevention.

The expanded role of pharmacology and toxicology in the health-related sciences is evidenced by the increased need for highly trained professional personnel (Ph.D., M.S., MD-Ph.D., PharmD-Ph.D. degrees). This need is reflected in the number of positions available in research-teaching-service areas of health professional schools (of human and veterinary medicine, pharmacy, dentistry, nursing), university graduate and undergraduate programs, pharmaceutical and chemical industries, hospitals, and state and federal government research and regulatory agencies.

The Graduate Program in Pharmacology and Toxicology at The University of Arizona is oriented towards modern pharmacology and toxicology, especially in those areas dealing with mechanisms of therapeutic and/or toxic actions of chemicals. Emphasis is placed on the physiological, biochemical and molecular mechanisms of actions.

## 2.0 THE GRADUATE PROGRAM ORGANIZATION

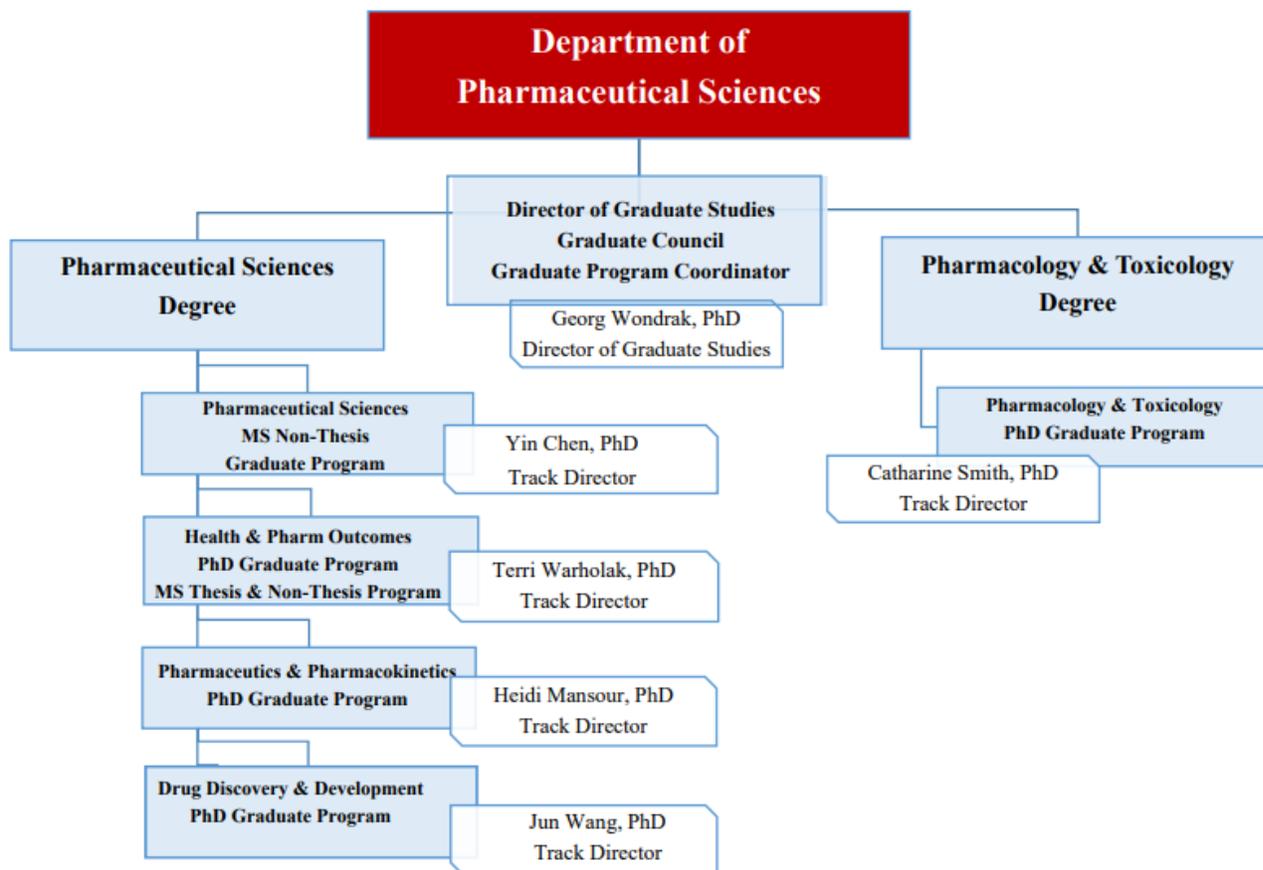
### 2.1 PHILOSOPHY AND GOALS

The major objective of the Graduate Program in Pharmacology and Toxicology is to train students to become scientists in various areas of pharmacology and toxicology. It is also expected that graduates of the program will have an opportunity to acquire effective teaching skills. Evaluations of student performance are the responsibility of the faculty and several committees.

### 2.2 GRADUATE COUNCIL IN THE DEPARTMENT OF PHARMACEUTICAL SCIENCES FOR GRADUATE PROGRAMS

The Graduate Council in the Department of Pharmaceutical Sciences for Graduate Programs in the College of Pharmacy is comprised of one voting faculty member from each of the program tracks, one non-voting program coordinator, and a non-voting graduate student representative. The Council formulates policies and coordinates activities of the graduate program for all disciplines within the College of Pharmacy, including the Pharmacology & Toxicology track. This council is charged with the overall evaluation of graduate student performance and also makes final decisions concerning applicants for admission to the program. The student representatives are not included in the evaluation of student performance or admitting students into the program.

The council is also charged with overseeing all curriculum matters. A chart of the organizational structure of the graduate tracks that are housed within the College of Pharmacy is shown below.



### 2.3 EXECUTIVE COMMITTEE ON PHARMACOLOGY AND TOXICOLOGY

The Pharmacology and Toxicology Executive Committee consists of five voting faculty members and one non-voting program coordinator. The Committee formulates policies, coordinates activities of the Pharmacology and Toxicology Program, evaluates student progress, considers curriculum matters, and evaluates and selects applicants for admission to the program.

#### CONTINUING COMMITTEE MEMBERS

Name	Phone	Email	Room
Dr. Catharine Smith <b>Program Track Director</b>	520-626-8349	<a href="mailto:csmith@pharmacy.arizona.edu">csmith@pharmacy.arizona.edu</a>	Pharmacy Bldg Rm 136
Dr. Xinxin Ding	520-626-9906	<a href="mailto:xding@pharmacy.arizona.edu">xding@pharmacy.arizona.edu</a>	Pharmacy Bldg Rm 341F
Dr. Qing-Yu Zhang	520-621-3667	<a href="mailto:qyzhang@pharmacy.arizona.edu">qyzhang@pharmacy.arizona.edu</a>	Skaggs Bldg Rm 238A
Dr. Jim Galligan	520-626-6015	<a href="mailto:jgalligan@pharmacy.arizona.edu">jgalligan@pharmacy.arizona.edu</a>	Pharmacy Bldg Rm 208
TBD			

### 2.4 GRADUATE STUDENT REPRESENTATIVES

A Graduate student representative is elected by the graduate student body of the Program in Pharmacology and Toxicology for a two-year-term. The representatives serve as an official liaison between the students and faculty of the Program. The representative is a non-voting member of the Executive Committee. The representatives are responsible for organizing graduate student participation in Program endeavors, as well as serving on Program committees in an advisory capacity. Each student should seriously consider his/her choice for the graduate student representative(s) in order to maintain an effective student voice in Program issues.

### 2.5 PARTICIPATING FACULTY

The following is a list of full and associate faculty with whom students may pursue their research. Students wishing to conduct research with Associate Faculty Members or University of Arizona faculty outside the core and associate faculty listed are required to obtain permission from the track director.

#### **Chen, Yin, PhD, Associate Professor, Pharmacology & Toxicology**

Research interest is to understand the dysfunction of airway epithelium in the pathogenesis of a variety of acute and chronic airway diseases.

#### **Nathan Cherrington, PhD, Professor, Pharmacology & Toxicology, Associate Dean of Research**

Molecular mechanisms of variable drug response that make certain individuals more sensitive to adverse drug reactions. We study what factors alter the expression and function of the drug metabolizing enzymes and transporters that determine the fate of drugs.

#### **Xinxin Ding, PhD, Department Head, Pharmacology & Toxicology**

Biomarker research; chemical carcinogenesis; drug/xenobiotic metabolism; drug safety; environmental health; lung diseases; molecular/mechanistic toxicology; pharmacogenomics

#### **Bernard W. Futscher, PhD, Professor, Pharmacology & Toxicology**

Functional genomics; molecular biology of cancer; cancer pharmacology.

**James Galligan, PhD, Assistant Professor, Pharmacology & Toxicology**

The Galligan lab's primary research focus is to understand the link between cellular metabolism, epigenetics, and disease etiology. Although cellular metabolism is generally efficient, metabolic processes often result in a number of intrinsically reactive by-products that are capable of modifying lipids, DNA, and proteins.

**Aikseng Ooi, PhD, Assistant Professor, Pharmacology & Toxicology**

Molecular carcinogenesis; Mutation-driven transcriptional and metabolic reprogramming; Carcinogen-driven transcriptional and metabolic reprogramming; Computational biology.

**John W. Regan, PhD, Professor, Pharmacology & Toxicology**

Molecular pharmacology of G-protein coupled receptors: use of cloning, mutagenesis and expression to study receptor structure and the interaction of receptors with second messenger systems.

**Catharine L. Smith, PhD, Associate Professor, Pharmacology & Toxicology**

Epigenetic mechanisms of gene regulation, steroid receptor action in breast cancer, signal transduction and cell cycle control, mechanism of anti-cancer drug action.

**Richard R. Vaillancourt, PhD, Associate Professor, Pharmacology & Toxicology**

Molecular and biochemical characterization of serine/threonine protein kinases that function as part of sequential protein kinase pathways.

**Qing-Yu Zhang, PhD, Professor, Pharmacology & Toxicology**

Our main focus is to study the regulation of intestinal P450 expression and function by physiological, pathological, and environmental factors, and the P450 function in drug clearance, drug-induced toxicity, and inflammatory bowel disease.

**Haining Zhu, PhD, Professor, Pharmacology & Toxicology**

The Zhu lab studies RNA binding proteins and RNA metabolism including protein translation and stress granules. We are also interested in protein phase separation and aggregation in vitro and in vivo and their relevance in human diseases. We strive to better understand the molecular mechanisms for neurodegenerative diseases and other diseases such as cancer. In addition, we are interested in therapeutic development targeting the molecules identified in our mechanistic studies.

**ASSOCIATE FACULTY:**

**Eli Chapman, PhD, Associate Professor, Drug Discovery and Development**

Our lab is a chemical biology lab that is focused on a number of disease states with a primary emphasis on cellular quality control pathways, such as proteostasis and redox homeostasis. We use chemistry, biochemistry, biophysics, structural biology, and cell and molecular biology to discover and develop targeted protein modulators.

**Chris Hulme, PhD, Professor, Drug Discovery and Development**

Discovery and development of novel neurodegenerative therapeutics; high-throughput Medicinal Chemistry and the development of novel chemistries with iterative efficiency to expedite the drug discovery process; Microwave Assisted Organic Synthesis (MAOS) and Multicomponent reactions (MCRs).

**Hongmin Li, PhD, Professor & R. Ken and Donna Coit Endowed Chair in Drug Discovery & Development**

Investigating the structures, functions and mechanisms of essential macromolecules involved in various cellular actions and disease processes and developing novel biochemical and cellular assays for different drug targets.

Research focusing on development of therapeutics against cancers and human pathogens such as dengue virus, Zika virus, SARS-CoV-2, Cryptococcal fungi and Mycobacterium tuberculosis

**Heidi Mansour, PhD, Associate Professor with Tenure, Pharmaceutics and Pharmacokinetics**

Research in the Mansour lab focuses on the fundamental and applied aspects of surface and interfacial chemistry, nanotechnology, and particle engineering technologies in the design and optimization of advanced drug delivery systems.

**Jason Karnes, PharmD, PhD, BCPS, FAHA, Assistant Professor, Pharmacy Practice & Science**

Karnes uses translational approaches in cardiovascular pharmacogenomics to develop genotype-guided prescribing and prevent adverse drug events.

**Rick Schnellmann, PhD, Dean and Professor, Drug Discovery and Development**

Identifying and developing drugs to treat acute kidney injury, diabetic kidney disease, stroke, spinal cord injury and Parkinson's disease through mitochondrial biology.

**Daekyu Sun, PhD, Associate Professor, Drug Discovery and Development**

Discovery and development of a new therapeutic strategy to repress the transcriptional activation of the human VEGF, HIF-1 $\alpha$  gene, RET, and other oncogenes with small molecules capable of binding selectively to non-canonical DNA structures formed within the promoter region of this gene; Study of the mechanism of action of novel anticancer agents derived from natural products: Investigation of DNA-repair interference as a potential approach for cancer treatment.

**Greg Thatcher, PhD, Professor & R. Ken and Donna Coit Endowed Chair in Drug Discovery and Development**

Small molecule drug discovery projects have led to two cancer therapeutics having completed clinical trials in 2019, the result of applying modern techniques in medicinal chemistry, chemical and cell biology, and the use of animal models in an integrated multi-disciplinary approach. Students are expected to master at least one discipline in drug discovery and become conversant in all other aspects of the process. Current projects span Alzheimer's disease to COVID-19.

**Jun Wang, PhD, Associate Professor, Drug Discovery and Development**

My lab is interested in developing antiviral drugs and elucidating their mechanism of action as well as resistance mechanism. We are exploring both small molecule and miniprotein-based therapeutics to target either viral proteins or host factors that are essential for viral replication. Targets of particular interest include ion channels and protein-protein interactions. We implement a wide variety of techniques for these studies including assay development (target-based and phenotypic-based), computational screening, medicinal chemistry, structural biology, virology, and in vivo animal models. The goal is to identify first-in-class drug candidates for emerging and re-emerging viruses such as influenza, enterovirus, zika and dengue viruses.

**Wei Wang, PhD, Professor, Drug Discovery and Development and Director, Arizona Center for Drug Discovery**

My research aims at exploring innovative and useful chemical tools to address important and challenging biological questions in drug discovery and chemical biology. Toward this end, we take two approaches: 1) develop sustainable synthetic strategies including cascade reactions and organocatalytic and photochemical transformations to navigate new chemical space for drug discovery and 2) design functional molecular probes to understand the mechanism of action of proteins and spatiotemporally control cellular functions.

**Georg Wondrak, PhD, Professor, Drug Discovery & Development, Director of Graduate Studies**

My research examines the pathological role of oxidative and proteotoxic stress in solar photodamage and melanoma/nonmelanoma skin cancer aiming at the design of novel molecular strategies for chemotherapeutic and/or cytoprotective intervention.

**Samuel Yalkowsky, PhD, Professor, Pharmaceutics and Pharmacokinetics**

He is currently involved in basic research on the relationships between chemical structure and physical phenomena such as solubility, partitioning, and melting.

**Donna Zhang, PhD, Professor, Pharmacology & Toxicology**

The research projects in my laboratory are focused on (1) Mechanistic studies of the Nrf2/Keap1 signaling pathway that is activated by oxidative stress and chemopreventive compounds, (2) the protective role of Nrf2 in arsenic-induced toxicity and carcinogenicity (this project is funded by NIEHS R01 award), and (3) regulation of gene expression by the ubiquitination and proteasomal degradation pathway.

## 3.0 PHYSICAL RESOURCES AND FACILITIES

### 3.1 LABORATORY SPACE

The Department of Pharmacology and Toxicology is housed in the College of Pharmacy building on the Health Sciences Center campus. In addition to individual research laboratories, shared laboratory space includes an autoradiography laboratory, a procedures laboratory, a general instrument laboratory, a tissue culture facility, and a pulmonary toxicology facility. We also have faculty housed in the Cancer Center, the Keating Bio5 building, and other AHSC locations.

### 3.2 EQUIPMENT RESOURCES

Availability of modern scientific instruments is crucially important to research and graduate education programs. We are fortunate to possess ample instrumentation to conduct research at all levels of biological organization. Each investigator's laboratory is equipped with specialized instrumentation required for research in their particular field.

Pharmacology and toxicology laboratories are especially well equipped with instruments necessary for biological analysis, including spectrophotometers, amino acid analyzers, high performance liquid chromatographs, gas chromatographs, and a mass spectrometry facility. All laboratories have access to modern computers and data processing systems. The number of liquid scintillation counters, gamma counters, preparative centrifuges, as well as behavioral, neuropharmacological instruments is ample.

### 3.3 LIBRARY RESOURCES

The University of Arizona takes pride in the outstanding quality of its libraries. UA Libraries are made up of the Main Library, Science-Engineering Library, Fine Arts Library, and Health Sciences Library and they hold extensive collections of periodicals, monographs and special collections.

The Health Sciences Library <http://ahsl.arizona.edu/> is located at the Arizona Health Sciences campus. It is the largest, most comprehensive health sciences library in Arizona. In addition to its holdings of pertinent health sciences periodicals and monographs, the library provides an excellent array of valuable services including bibliographic searches, librarian consults, and research support. The Health Sciences Library provides access to essential medical information, and specialized databases such as Embase, the world's largest database of drug information. Librarians participate as instructors in the curriculum of the health sciences colleges, and work in partnership with researchers and clinicians to advance health information literacy. The library also provides spaces for small group collaboration and quiet study.

### 3.4 EXPERIMENTAL ANIMALS

The availability of high-quality experimental animals is of great importance to modern research in pharmacology and toxicology. Graduate students MUST become familiar with safe and humane animal care and handling techniques. The University Animal Care Facility procures and cares for all animals used in teaching and research by the Program. The staff of University Animal Care is available to students for consultation on problems related to the use of animals in scientific research.

**All students are required to complete a training course by the University Animal Care staff before the end of their first semester of residence in order to comply with federal, state and local regulations governing animal care.**

### **3.5 LABORATORY SAFETY AND ENVIRONMENTAL HEALTH**

**Students are required to attend courses on these topics by end of their first semester of residence, preferably as soon after their arrival as possible.** It is the responsibility of all personnel involved in scientific study to be aware of the safety precautions and the proper disposal of hazardous wastes specific to the research effort. The student has a moral obligation to not only familiarize him/herself with, but also follow, the specifics of laboratory safety associated with his/her desired area of research. The offices of Risk Management and Radiation Control offer seminars covering such subjects as fire prevention, hazardous waste disposal, compressed gas safety, basic radiation protection, and industrial hygiene, etc. Laboratory directors and technicians are the best source for day-to-day laboratory safety techniques and advice on safety seminars required for laboratory personnel.

### **3.6 POISON CONTROL CENTER**

The College of Pharmacy is responsible for the operation of a Arizona Poison Control and Drug Information Center; these facilities are located in the Roy P. Drachman Building room B308. Faculty and fellows in Clinical Pharmacology provide expert advice and consultative services for these centers.

### **3.7 CENTER FOR TOXICOLOGY SOUTHWEST ENVIRONMENTAL HEALTH SCIENCES CENTER**

The Center for Toxicology was established in 1988. Funding is provided by the National Institute of Environmental Health Sciences established the Southwest Environmental Health Sciences Center (SWEHSC). The mission of the Center for Toxicology and SWEHSC, with over 50 investigators, is to expand and strengthen education, research and service in toxicology and environmental health sciences. For more information regarding the Center for Toxicology visit the website at:

<http://swehsc.pharmacy.arizona.edu/>

## 4.0 GENERAL INFORMATION

### 4.1 STUDENT RESPONSIBILITIES

Students are expected to fully comply with the Code of Academic Integrity as detailed by the University of Arizona Dean of Students: [https://deanofstudents.arizona.edu/policies-and-codes/code-academic-integrity#student\\_responsibility](https://deanofstudents.arizona.edu/policies-and-codes/code-academic-integrity#student_responsibility)

Students engaging in academic dishonesty diminish their education and bring discredit to the academic community. Students shall not violate the Code of Academic Integrity and shall avoid situations likely to compromise academic integrity. Students shall observe the generally applicable provisions of this Code whether or not faculty members establish special rules of academic integrity for particular classes. Students are not excused from complying with this Code because of faculty members' failure to prevent cheating.

The Graduate Program in Pharmacology and Toxicology stresses to the student the following issues of the utmost importance. First, any student who is found to be using drugs for non-experimental purposes will be expelled from the Program. Second, students are to conduct their experiments in an ethical manner; experimental fraud related to the creation of false data or the theft of others' work will not be tolerated by this Program. Students should keep their data in a format acceptable to the research advisor and be prepared to turn over their records to the Graduate Program at any time. Third, the student is expected to complete the required and elective coursework in a timely manner under the ethical constraints of the College in which the course is being offered.

Students must also be aware of Graduate College requirements and general University policies and deadlines. University policies can be reviewed at <https://catalog.arizona.edu/>.

#### 4.1.1 Instructional Services Assistant

Graduate students in the College of Pharmacy are required to participate as an Instructional Services Assistant as part of their professional development and growth. The College of Pharmacy is committed to supporting our students as researchers first and foremost. Instructional Services Assistants will assist Course Instructors in managing courses as needed with administrative duties (e.g. exam proctoring, office hours, grading, grade entry, and/or grade-book maintenance) rather than taking on major teaching/lecturing responsibilities. As such, students will continue to be supported as Research Assistants rather than Teaching Assistants to emphasize priority in research. Assignments in the College of Pharmacy are designed to provide students unique opportunities in professional development to gain valuable experience and communication skills that will bolster their CV and support the educational mission of the college.

Students admitted directly into the College of Pharmacy will serve as Instructional Services Assistants during their first two semesters. Since students admitted through ABBS must take two additional courses as part of the ABBS program, they will only need to serve as an Instructional Service Assistant for one semester in Year 2. Assigned classes will include those that are in the curriculum of the undergraduate (Bachelors of Science in Pharmaceutical Sciences - BSPPS) and professional (PharmD) programs in the Pharmacy Practice and Science Department and the Pharmacology and Toxicology Department within the College of Pharmacy. Assignments are made prior to the start of a semester by the Assistant Dean of Academic Affairs and Assessment (Dr. Warholak), who will match students to courses based on their schedule and interests.

Instructional Service Assistant tasks will vary depending on the course and instructor, but typically include holding office hours, grading, exam proctoring, grade entry, grade-book maintenance or other administrative duties. College of Pharmacy Professors may be open to having the Instructional Service Assistant give lectures, if the student wishes to develop and practice teaching skills; however, this is not required. Each student should work with their supervisor and/or Professor to confirm their responsibilities and ask for feedback. Again, the student's primary responsibility is their research commitment, but participation in professional development opportunities can be a very important step toward meeting career goals.

## **4.2 ORIENTATION**

All new students who did not enter the program through the Arizona Biological and Biomedical Sciences (ABBS) program must attend an orientation session held prior to the first day of classes. The program coordinator will inform the incoming students of the time and location of this orientation in advance.

## **4.3 INDIVIDUAL HEALTH INSURANCE THROUGH CAMPUS HEALTH SERVICES**

Students who are hired as a Graduate Assistant/Associate (GA) are eligible to receive individual health insurance through Campus Health Services. The student's admission paperwork must already have been submitted to the Graduate College before they are able to enroll. Even though the charges for health insurance show up on your student account, the university will off-set the charge later. You will not be responsible for health insurance costs.

Health insurance coverage for the fall semester begins the Monday prior to the beginning of classes, and continues until the beginning of the spring semester. Coverage for the spring semester starts at the beginning of the spring semester and continues through the summer. New students must register for health insurance when registering for courses on-line through the UA Student Link system. Continuing students who were enrolled in student health insurance in the previous semester will be automatically re-enrolled. Once you have enrolled in the plan, your coverage cannot be canceled, even if you resign or are terminated as a GA. If you resign or are terminated from your GA during the period of coverage, you will be personally responsible for the payment of the remaining coverage.

## **4.4 CREATING A UA EMAIL ACCOUNT AND NET ID, AND PHARMACY EMAIL ACCOUNT**

All UA students are required to set up a UA email account (free to UA students), but first a UA Net ID must be established. The instructions on the UITS website (<https://netid.arizona.edu/>) will walk you through establishing your UA NetID, and then your email account. Students in the College of Pharmacy will also have a College of Pharmacy computer and email account created for them. The College of Pharmacy email will be the primary email account. Students should forward their UA email to their College of Pharmacy account so they only have to check one email account and not both.

After the UA student has created a UA Net ID, the student may access the University of Arizona UAccess Student Center System, also known as GradPath. Deadlines for the submission of paperwork pertaining to doctoral programs, as well as all forms, are available online through GradPath and can be accessed from: <https://uaccess.arizona.edu/>

#### 4.5 FINANCIAL SUPPORT

Financial assistance in the form of research assistantships or traineeships is available to all first year Ph.D. students admitted into the Program. Assignment of students to training grants is a responsibility of individual training grant advisory committees. Later support will include either traineeships or research assistantships. Students are also encouraged to apply for individual predoctoral fellowships from sources outside the University. Appointments as research assistants provide remission for tuition and health insurance. It is the responsibility of the student to pay misc. fees. Financial assistance for M.S. students is dependent on the availability of funds.

*First-year directly admitted PhD students in the College of Pharmacy will be partially supported by College (instructional services) funding. Students will be assigned ISA duties in their first year based on course needs. The limited funds will be allocated based on the number of direct admits, and the support from the College to a student will be evenly distributed throughout the academic year.*

*Directly admitted students will join a faculty member's lab. Faculty are responsible for the remaining monthly coverage of a student's first-year funding. **Students have the option to change labs, but it is their responsibility to find that lab. Faculty are responsible for paying their share of the student's monthly coverage until a lab change is official.***

#### 4.6 GRADUATE ASSISTANT/ASSOCIATE STIPEND LEVELS AND BENEFITS

##### FOR STUDENTS ON NOTICE OF APPOINTMENT:

FISCAL	50% FY	TUITION WAIVER FALL/SPRING	100% FALL/SPRING REGISTRATION REMISSION	STUDENT INSURANCE FULL YEAR
Graduate Associates (All 1st-Year Students) Late start in August	Refer to ABBS			
COP Graduate Associates	\$27,540	\$20,184 (Non-Arizona Domicile/Int'l only)	\$12,106	\$2,861

##### **All students must pay mandatory fees!**

The fees for Academic Year 2021-2022 are \$676.87 per semester (fall and spring only) and are **due the first day of class.**

**Students not on Notice of Appointment:** refer to the Bursar's office tuition link that includes a breakdown of tuition by unit/per their respective admission year as well as the fees they are required to pay by the first day of classes each fall and spring semester: <https://tuitioncalculator.fso.arizona.edu/#/>

#### 4.7 GRADUATE ASSISTANTSHIPS/ASSOCIATESHIPS

Please refer to the Graduate College GA Hiring Manual for complete details regarding your GA. <https://grad.arizona.edu/funding/ga>

## 4.8 TAX INFORMATION

Students should be aware of current tax laws which impact salaries or stipends from graduate teaching/research assistantships, fellowships, and stipends. Contact the IRS at (800) 829-1040 and ask for the scholarship/fellowship publication or visit the IRS forms/publications website at <http://www.irs.gov/>

Graduate students, who are in Graduate Assistant/Associate positions, must be enrolled in half-time status in order to qualify for exemption from FICA taxes. (Rev. Proc. 98-16.) . ***To be exempted from FICA taxes, graduate students will need to be enrolled in at least 6 units during the fall and spring semesters, and in at least 3 units during Summer I and II. (information subject to change, please reference Bursar's website)***

## 4.9 CHILD CARE SUBSIDIES AND FAMILY FRIENDLY INFORMATION

The Graduate College is dedicated to promoting and strengthening family relationships. Many resources have been designed to help graduate students balance and manage family, work, and school.

- Graduate Assistant/Associate Parental Leave at <https://grad.arizona.edu/funding/ga/benefits-appointment>
- Temporary Alternative Duty Assignments (TADA) for Teaching Assistants/Associates at <https://grad.arizona.edu/funding/ga/temporary-alternative-duty-assignments-graduate-assistantsassociates>
- Extension of Time to Degree Policy at <https://grad.arizona.edu/policies/academic-policies/extension-time-degree>
- Life & Work Connections - Child and Elder Care Resources <https://lifework.arizona.edu>

## **5.0 GRADUATE STATUS AND ADMISSION**

### **5.1 REGULAR GRADUATE STATUS**

Students who meet all admission requirements may be admitted to Regular Graduate Status to undertake work leading to an advanced degree.

### **5.2 GRADUATE NON-DEGREE STATUS**

Individuals holding a bachelor's degree, or its equivalent, from a college or university which grants degrees recognized by The University of Arizona, may attend graduate-level courses without being admitted to a graduate degree program. Such students may enroll in graduate level coursework as their qualifications and performance permit. It is advisable to contact the department(s) offering courses of interests, to insure that the courses are available to non-degree students. Up to twelve (12) units of graduate credit, earned in non-degree status and/or transferred from other institutions, may be petitioned for application toward an advanced degree once the student obtains regular admission to a degree program. International applicants requiring a student visa are not eligible for graduate non-degree admission.

### **5.3 CONDITIONAL ADMISSION**

Although the College of Pharmacy does not generally admit students conditionally, the program's admissions faculty may recommend conditional admission on a case-by-case basis if the prospective student meets all Graduate College requirements except the minimum English proficiency requirement. For more information, visit International Conditional Admission at:

<https://grad.arizona.edu/admissions/types/international-admission-types#intl-conditional>

### **5.4 M.S. PHARMACOLOGY & TOXICOLOGY GRADUATE STUDENTS ADMISSION TO PH.D. PROGRAM**

The M.S. degree is a terminal degree and will require reapplying for admission to the Ph.D. Program.

## 6.0 Ph.D. PROGRAM IN PHARMACOLOGY AND TOXICOLOGY

### 6.1 ADMINISTRATION

The Pharmacology & Toxicology track director helps the first-year student plan his/her program with an emphasis on the first year's courses. **Approval of courses in the minor will be done by the Pharmacology & Toxicology track director** until the student has a research advisor and dissertation committee. In succeeding years, the student's major advisor and dissertation committee tailors the coursework to fit specific needs and objectives. The faculty encourages the student to take advanced courses in pharmacology, toxicology, biochemistry, chemistry, pathology, and physiology, and to diversify his/her program with courses in genetics, microbiology, biological sciences, molecular biology, or mathematics.

The research advisor and dissertation committee will help the student plan an educational program in which coursework is completed as quickly as possible, usually in the first two years of graduate study. Because of individual interests or conflicts in scheduling, some formal coursework may extend into the third year of graduate study.

### 6.2 RESEARCH ADVISOR AND DISSERTATION COMMITTEE

Prior to the selection of a research advisor, the student must become familiar with the research interests of the faculty. Students should meet individually with the faculty whose research is of particular interest or potential interest. Additional familiarity is gained through the laboratory rotations.

After these preliminary interviews and laboratory rotation experiences, the student decides with whom he/she would like to do his/her dissertation research. After consultation with, and agreement of the faculty member, the student must communicate this decision to the Program office before the end of the spring semester. No official commitments between students and faculty should be made until this date. The research advisor must be a tenure track full faculty member in the Program. In the event that the research project is carried out in the laboratory of an individual who is not a member of the Program Faculty, a co-director from the Program faculty must be appointed. Also, in the event the research project is carried out in the laboratory of an associate faculty member, permission from the Executive Committee is required.

Shortly after the selection of the research advisor, no later than the end of the spring semester of the second year, a dissertation committee is formed. **The dissertation committee consists of a total of five (5) members and should include at least three (3) members from the major and (1-2) from the minor field.** The committee is chaired by the research advisor. The research advisor and student discuss the membership of the dissertation committee and decide who to invite to serve. Faculty members on the dissertation committee are generally selected on the basis of their ability to provide useful advice about the research problem, to assist in selection of appropriate coursework, and to help guide the student to successful completion of degree requirements. The student invites faculty members to serve on his/her committee. **Once the committee has been assembled, approval from the Pharmacology & Toxicology track director is required.**

The first research committee meeting should take place prior to the student taking the written portion of the comprehensive examination in order to introduce themselves, summarize their progress towards finishing course requirements, summarize their research project, and discuss their research proposal which is due June 1st. After this first meeting **the student will meet with their dissertation committee at least once a calendar year (June 1 - May 31) to review progress in coursework and research.** The meeting of the committee for the oral comprehensive exam in the fall of the third year does not count as an annual committee meeting to review student progress. A separate meeting will be scheduled by the

student in their third year to present research progress. The student must provide a dissertation committee meeting form at each annual committee meeting:

<http://gradstudent.pharmacy.arizona.edu/>. This form must be signed by all committee members present and include a summary of the meeting and discussion written by the committee chair at the time of the meeting.

Occasionally a member of a student's dissertation committee steps down, usually due to leaving their position at the university. Unless the student is within 6 months of the thesis defense, the student and the thesis advisor should make an effort to replace the missing committee member to maintain the number of thesis committee members at 5.

### 6.3 REQUIRED COURSES FOR PHARMACOLOGY AND TOXICOLOGY MAJOR

A minimum of 36 units of course work in the area of the major subject including 4 seminar units, 6 laboratory rotation units, and 4 research conference units, will be counted towards the student's Plan of Study. Nine units in the minor subject, and 18 units of dissertation must also be completed. Please note that seminar and research conference registration is required every semester, even though only 4 units of credit will be applied to the Plan of Study.

#### REQUIRED COURSES

PCOL 501	Introduction to Pharmacology, Drug Discovery & Pharmaceuticals (fall)	4
PCOL 520a	Cellular Communications and Signal Transduction (Spring)	4
PCOL 535	General and Systems Toxicology (Fall)	3
BIOS 576a	Biostatistics	3
PHCL 595b	Scientific Writing, Presentation, and Bioethics <b>OR</b>	2
SLHS 649	Survival Skills and Ethics (3 units)	(3)
PCOL 696a	Student Seminar (1 credit/semester)	4
PCOL 695a	Research Conference (register each semester 2 units)	4
MCB 795a	Lab Rotation (2 credits per rotation first year) <b>OR</b>	6
PCOL 900	Lab Rotation for direct admits (2 credits per rotation first year)	(6)
<b>TOTAL</b>		<b>31*</b>

\*NIEHS Trainees (T32) must take the following course offered every other year:

PCOL 573	Environmental Toxicology Colloquium, (Fall) Discussion/Lecture	1
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#### ELECTIVE COURSES

Need enough units from the list below (see Minor) to total 36 for the major. Courses outside this list may also be used as electives with the permission of the thesis advisor and track director.

Any other elective courses not used for the major can be used to fulfill the (9) unit requirement for a multidisciplinary Pharmacology & Toxicology minor.

#### Fall

PCOL 530	Introduction to Molecular Therapeutics and Drug Discovery (Fall, 2 units)	Lecture, J Wang
PCOL 505	Current Techniques in Pharmaceutical Sciences (Fall, 3 units)	Lecture, Sun
PCOL 601a	Epigenetics in Development and Disease (Fall, 2 units)	Lecture, Futscher
PCOL 695d	Regulatory Science (Fall/Spring, 1 unit)	Colloquium
PCOL 595H	Problems in the Biology of Complex Diseases (Fall, 2 units)	Colloquium
EHS 584	Fundamentals of Industrial and Environmental Health (Fall, 3 units)	Lecture

### Spring

PCOL 550	Drug Metabolism & Disposition (Spring, 2 units)	Lecture, Q Zhang
PCOL 515	Mechanisms of Human Diseases (Spring, 4 units)	Lecture/Lab, Briehl
PSIO 511	Physiology For Biomedical Engineering (Spring, 3 units)	Lecture
CBIO 553	Advanced Topics in Cancer Biology (Spring, 4 units)	Lecture
EPID 677	Genetic Association Studies in Epidemiology (Spring, 2 units)	Lecture
MCB 516a	Bioinformatics and Genomic Analysis (Spring, even year, 3 units)	Lecture

### **MINOR REQUIREMENTS (9 UNITS)**

One minor is required. Students may choose from among the following approved minor list. Other options will be considered but must be approved individually by the student's major advisor and the Pharmacology and Toxicology Executive Committee. The minor department should be contacted to find out specific requirements for that minor as some programs may require more than 9 units. Please note that some minors require **6 of the 9 units to be taken prior to the comprehensive oral exam.**

### **SUGGESTED MINORS FOR PHARMACOLOGY AND TOXICOLOGY MAJORS**

1. Pharmacology & Toxicology (Multidisciplinary)
2. Physiology
3. Molecular and Cellular Biology
4. Immunobiology
5. Cellular and Molecular Medicine
6. Cancer Biology
7. Neuroscience
8. Drug Discovery and Development
9. Pharmaceutics
10. Medical Pharmacology
11. Biochemistry and Molecular and Cellular Biology

### **DISSERTATION (18)**

#### **6.4 LABORATORY ROTATIONS**

ABBS graduate program members: follow guidelines and procedures as applicable. Each first-year student must participate in research laboratory rotations (MCB (PHSC) 795a). The objective of the required laboratory research rotations is the introduction of the graduate student to research and familiarization with the scope and nature of the faculty's research endeavors. The research laboratory rotation constitutes a major part of the first-year graduate curriculum, and performance in the rotation will bear heavily upon overall evaluation of the student. Upon completion of each rotation, the student is evaluated by the faculty mentor using a form provided by the student (distributed through the ABBS

program). This evaluation is based on the student's initial familiarity with the research, the development of library and literature skills, ability to apply the scientific method and use pharmacological and toxicological principles, development of laboratory skills, and overall attitude toward the research project. The student and faculty member may also discuss the potential for choosing the lab as a thesis lab. The student also writes a summary of their project, and the report is then forwarded to the ABBS graduate program coordinator's office where it is placed on file to become part of the student's record. The student will also present their work in a group setting (Rotation Presentation). **Please refer to ABBS Handbook and Schedule.** <https://abbs.arizona.edu/>

Students directly admitted to the Pharm/Tox graduate track (Track-specific Admits) will participate in three laboratory research rotations (PHSC795A) for the purposes described above for ABBS. Rotations should be done only with labs that have funding for a student. A list of open labs will be supplied to the direct admit students. The evaluation process is also similar to that described for the ABBS graduate program except that the reports and evaluations are forwarded to the Pharmacology and Toxicology graduate coordinator.

Students admitted to the Pharmacology and Toxicology program to work specifically with a particular faculty member (Mentor-Specific Admits) are not required to do lab rotations as they are supported financially by the faculty mentor. However, *if the faculty mentor agrees*, the student can do a research rotation in another lab. Evaluation of the student will be carried out by the faculty mentor and a committee specifically-designated for the student that does not include the mentor (Early Support Team). This committee will consist of the track director or Director of Graduate Studies (DGS) and one other faculty member. The committee will formally meet with the student once per semester with the purpose of evaluating the student's progress and providing the student with an opportunity to communicate concerns. The committee will make a report summarizing the student's progress/concerns after each meeting. The committee will also receive such a report from the student's faculty mentor each semester. If problems develop, the Early Support Team will make a plan of action to resolve the problems on a case-by-case basis in consultation with the Director of Graduate Studies. The Early Support Team will be dissolved once the student formulates their thesis committee in the second semester of their second year in the program.

UA PharmD/Ph.D. students will be required to complete two (2) rotations if they have not done so during their PharmD studies. The research laboratory rotation constitutes a major part of the first-year graduate curriculum and performance in the rotation will bear heavily upon overall evaluation of the student. Performance criteria to be used by the laboratory director will include assessment of the student's initial familiarity with the research, the development of library and literature skills, ability to apply the scientific method and use pharmacological and toxicological principles, the development of laboratory skills, attitude toward the research project, and a final written report/or oral presentation prepared by the student.

## **6.5 SEMINAR PCOL 696A (TUESDAY, 11-11:50 A.M.)**

These seminars are presented by the students, faculty and invited speakers in the Graduate Program. Seminars are an opportunity for students to practice presentation skills and to update the faculty and students on their research progress. **Students are required to register for PCOL 696a for the fall and spring semesters for their term of full-time residence in the Program.** Grades are calculated based on presentation and attendance. First year students are not required to present a seminar, so their grade will be determined by attendance only. Ph.D., MD/Ph.D. and PharmD/Ph.D. students are required to present a seminar each academic year beginning in the second year until the final defense (final defense will be

counted as a seminar presentation). Generally, senior students will present in the fall, whereas second year students will present in the spring. M.S. students are required to present 1 seminar.

PCOL 696a requires presentation of a 20-minute scientific seminar with a 5-minute question and answer session. However, students have the option of presenting a full-length seminar once during their time in the doctoral program with permission of the course coordinator. Required components of organizing and presenting seminars include:

- a. Student attendance at all of the required dates (see fall and spring schedules.)
- b. Faculty members will evaluate the seminar presentation for content and presentation skills. The student and evaluators meet immediately after the presentation for critique. The student should discuss the critique with their thesis advisor at a later time.
- c. Each student is required to document attendance at all seminars by signing the attendance sheet. One absence per semester is allowed without penalty. All absences must be requested well in advance of seminar date.

## **6.6 CREDIT REQUIREMENTS AND TRANSFER CREDIT**

A minimum of 36 units of course work in the area of the major subject, 9 units in the minor subject, and 18 units of dissertation must be completed. Graduate credit earned at other approved institutions, if accepted by the major department and the Graduate College and grade was A or B, may be counted toward the requirements of this degree, but will not be calculated in The University of Arizona G.P.A. All required units of credit must be at the 500-level or above at The University of Arizona (or, in the case of transfer units, their equivalent at other institutions). At least one half the units used on the Doctoral Plan of Study must be in courses in which regular grades (A, B, C) have been earned. A minimum of 13 units of regular grades taken at The University of Arizona are required to establish a University of Arizona G.P.A. Credit for correspondence courses or extension work obtained at other institutions will not be accepted for graduate credit.

Students who wish to use transfer credit must first submit a transfer request form to the Graduate College in GradPath before the end of their first year of study. This allows the Graduate College to evaluate the transfer credit while the transcripts are still in the Graduate College, and ensures that students will know early in their studies whether or not the credits are acceptable. The Graduate College evaluation simply determines whether or not the courses are eligible for transfer; the Pharmacology & Toxicology Executive Committee will still decide which courses should be part of the Program of Study.

## **6.7 REGISTRATION**

Registration is accomplished through the University of Arizona UAccess Student Center System. UAccess Student Center can be accessed from: <https://uaccess.arizona.edu/> Contact the Program office for registration of courses that are not open to web registration.

## **6.8 GRADUATE APPOINTMENTS MINIMUM REGISTRATION**

All graduate students in the College of Pharmacy who are supported by or through the University are considered to be full-time students. All full-time students are expected to enroll for some combination of coursework, research, or independent study that results in a minimum of twelve (12) units of credit for the academic semester. Students who have achieved candidacy and completing their degree in an academic semester may register for less than (12) units as determined by the Major Advisor and Program Office.

## **6.9 MINIMUM REGISTRATION REQUIREMENTS FOR STUDENTS NOT RECEIVING FUNDING**

Each student who is associated with the University in any capacity that utilizes University facilities or faculty time during any academic semester must be registered for at least three (3) units of graduate credit. Each student completing requirements for an advanced degree must be registered during the semester term during which requirements are completed, or the previous semester or term if requirements are completed during an intercession. This includes any semester during which a preliminary or final examination is scheduled.

Ph.D. students who have completed all the degree course requirements but have not completed the comprehensive examination should enroll for Research (PCOL 900). After completion of the comprehensive examination Ph.D. students should enroll for dissertation (PCOL 920). Although a maximum of eighteen (18) units of PCOL 920 may be claimed for credit on a student's Course Study Program, the student may enroll for as many units as needed to complete.

**Full-time Graduate Student Status:** A student who has completed all course work, the thesis/dissertation unit requirements, has advanced to candidacy, is working on the thesis/dissertation, and is not employed as a Graduate Assistant/Associate may apply for advanced status at: <https://arizona.app.box.com/v/grad-gsas-advancedstatus> which allows 1 unit of 900-level credit for full-time status. In all other cases, full-time status consists of a minimum enrollment in 9 units of graduate credit.

## 6.10 EXAMPLE COURSE SCHEDULE PH.D. IN PHARMACOLOGY AND TOXICOLOGY

### FALL - FIRST YEAR

### SPRING - FIRST YEAR

<u>Course</u>	<u>Units</u>	<u>Course</u>	<u>Units</u>
**Biochemistry Deficiency		**Biochemistry Deficiency	
<b>PCOL 501</b> Introduction to Pharmacology, Drug Discovery & Pharmaceutics MTWTH 1:00PM - 1:50PM	4	<b>PCOL</b> Elective or Minor (see list of suggested courses in Section 6.3)	2-3
<b>PCOL 535 Gen. &amp; Systems Toxicology</b> T/R: 2:30 – 3:50 PM	3	<b>PCOL 520a Cellular Communications &amp; Signal Transduction</b> MW 11:00 - 12:15PM, F 11-11:50 AM	4
<b>PCOL</b> Elective or Minor <b>PCOL 696a Student Seminar</b> T: 11:00 – 11:50AM	3	<b>PCOL 696a Student Seminar</b> T: 11:00 - 11:50 AM	1
<b>BIOS 576a Biostats in Public Health</b> (can be taken in fall of Yr II or spring) T/R: 4:00-5:15PM	1	<b>BIOS 576A Biostats in Public Health (ONLINE)</b>	3
<b>PCOL</b> Elective or Minor	2	<b>PHCL 595b Scientific Writing, Presentation 2 and Bioethics</b> <b>OR</b> T/R 11-11:50 AM	2
<b>Lab Rotation</b> MCB 795 (ABBS) PCOL 900 (direct admit)	4	<b>SLHS 649 Survival Skills and Ethics</b> W 3-3:50 PM	(3)
<b>PCOL 695a</b> (Lab meeting for TSA only)	2	<b>Lab Rotation</b> MCB 795 (ABBS) PCOL 900 (direct admit)	2
<b>PCOL 695a</b> (Lab meeting for TSA only)	2	<b>PCOL 695a</b> (Lab meeting for TSA only)	(2)
<u>Total</u>	<u>14-17</u>	<u>Total</u>	<u>15-17</u>

\*\* Passing a course on the fundamentals of biochemistry is considered essential to the completion of a doctoral degree in Pharmacology and Toxicology. If an incoming student needs to complete a 400 level Biochemistry course, it is to be approved by the PharmTox Track Director. Biochemistry 400 level courses are considered deficiency coursework and will not count toward degree unit requirements.

**Fall Course Electives** see list in section 6.3

\*\*\*Statistics requirement may be filled by taking either EPID 576a Biostatistics

\*Ethics Requirement may be filled by taking either SLH 649 or PHCL 595b and are offered in the Spring.

**Spring Course Electives** : see list in section 6.3

## 6.11 MINOR IN PHARMACOLOGY AND TOXICOLOGY FOR STUDENTS IN OTHER PROGRAMS

The faculty welcomes graduate students in other departments and programs of the University to minor in Pharmacology and Toxicology. Students are required to contact the Graduate Program Office and the Pharmacology and Toxicology Program Track Director, before proceeding with a minor. A student may minor in Pharmacology and Toxicology by completing nine (9) units of coursework listed below:

PCOL 530	Proteins and Nucleic Acids as Drug Targets	2 units
PCOL 535	General and Systems Toxicology	3 units
PCOL 601a	Epigenetics in Development & Disease	2 unit
PCOL 520a	Cellular Communications and Signal Transduction	4 units
PCOL 520b	Cellular Communications and Signal Transduction	<i>Currently not offered</i>
PCOL 550	Drug Metabolism and Disposition	2 units

## 6.12 GRADES IN CORE COURSES

Students must receive a grade of "B" or better in all core courses. A student who receives a grade of "C" or less in a core course must repeat that course. A student may submit a petition to the Pharmacology & Toxicology Executive Committee to have this repeat requirement waived; a waiver can be granted only with the written approval of the course instructor and approval from the Pharmacology & Toxicology Executive Committee. A grade of "C" or less in a core course constitutes grounds for dismissal from the Graduate Program.

## 6.13 MINIMUM ACADEMIC REQUIREMENTS

A student cannot receive a graduate degree unless he or she has achieved a grade-point average of 3.00 or higher on all course work taken for graduate credit, whether or not the courses are offered in satisfaction of the specific requirements for a specific graduate degree. A student whose cumulative GPA is below 3.0 for two consecutive semesters will be dismissed and may then reapply for non-degree status. Programs may allow students to take additional course work while in non-degree status. In order to graduate, the student may apply for readmission to the Graduate College through their graduate department. Readmission is not guaranteed.

## 6.14 SATISFACTORY ACADEMIC PROGRESS

In addition to maintaining a minimum 3.0 grade-point average, students are required to demonstrate satisfactory academic progress toward degree completion. The Program's policies on what constitutes satisfactory academic progress are listed below.

- Minimum Grades in a Required Course - Students must receive a grade of "B" or better in all core courses. A student who receives a grade of "C" or less in a required course must repeat that course. Students failing to obtain a "B" or higher in a required course that is repeated must petition the graduate program faculty to remain in the program. The decision to allow the student to continue in the program requires a majority approval of the program faculty.
- Student Evaluation – The Program Executive Committee evaluates each student on the basis of accomplishments in formal courses and performance in other areas of the Program including attendance and participation in seminars as well as performance in laboratory rotations. Satisfactory performance in courses and research are also required. Failure to meet performance criteria in any of these areas is grounds for dismissal from the Program.
- Annual Reports - All students will submit an annual report on or before June 1. The Annual Report must be approved by the Research Advisor and the track director after electronic submission to the College of Pharmacy graduate student interface (<http://gradstudent.pharmacy.arizona.edu/>). Annual Reports for every year matriculating in the program are mandatory.

- Sponsorship - By June 15 the Executive Committee makes a determination if each first-year student should be sponsored for the following year. This determination will be assessed yearly thereafter. Poor performance in assigned duties may result in the loss of sponsorship. Sponsorship decisions after the first year are made by the student's major advisor.
- Advancement to Candidacy - Students are evaluated for Advancement to Candidacy at the time of their comprehensive examination. If performance is substandard, the course of action is detailed in Section 6.22. Failure to pass the comprehensive exam results in the student's dismissal from the program.
- Dissertation/Thesis Committee Meetings - All students are required, after the formation of a dissertation/thesis committee, to have at least one research-focused committee meeting per year while in the Program.
- Completion Guidelines – Students will complete the following according to the time frame listed below.

<b>YEAR</b>	<b>TIME-FRAME GUIDELINES</b>
YEAR 1 And Summer	<ul style="list-style-type: none"> <li>• Complete at least three laboratory rotations</li> <li>• Complete deficiency coursework (if applicable)</li> <li>• Complete Yr I Core Coursework</li> <li>• End of First Year - selection of Mentor/Research Advisor</li> <li>• End of First Year – begin doctoral research</li> </ul>
YEAR 2	<ul style="list-style-type: none"> <li>• Continue doctoral research</li> <li>• Complete Yr II core coursework</li> <li>• Submit Doctoral Plan of Study to GradPath – Fall semester</li> <li>• Select Dissertation Committee</li> <li>• Present at Seminar – Spring semester</li> <li>• Attend meeting to discuss Comprehensive Exam (March)</li> <li>• Schedule 1<sup>st</sup> Research Committee Meeting</li> <li>• Identify &amp; obtain approval for written proposal topic by June 1st</li> <li>• Submit written portion of Comprehensive Examination by Aug. 1st</li> </ul>
YEAR 3	<ul style="list-style-type: none"> <li>• Continue doctoral research</li> <li>• Pass Written &amp; Oral Comprehensive Examination – Fall Semester</li> <li>• Submit Committee Appointment Form in GradPath</li> <li>• Present at Seminar – Fall Semester</li> <li>• Dissertation Committee Meeting</li> </ul>
YEARS 4 and 5	<ul style="list-style-type: none"> <li>• Present at Seminar – Fall Semester</li> <li>• Continue doctoral research</li> <li>• Dissertation Committee Meeting</li> <li>• Pass Final Examination (Dissertation Defense)</li> <li>• Identify employment opportunities</li> </ul>

## 6.15 STUDENT EVALUATION

On behalf of the Program Faculty, the Executive Committee evaluates each student on the basis of accomplishments in formal courses and performance in other areas of the Program including attendance and participation in seminars as well as performance in laboratory rotations. Satisfactory performance in courses and research are also required. Failure to meet performance criteria in any of these areas will result in a written warning with an opportunity to remediate. Continued failure to meet performance criteria is grounds for recommendation to the Graduate College that the student be dismissed from the Program.

After a student has formally joined a lab, it is sometimes the case that the faculty mentor wants to dismiss the student from the lab due to inadequate research performance or behavior. The mentor must document the case for doing so, including evidence that the student was clearly warned of the inadequacies, that a detailed, written remediation plan was made to allow the student to improve their performance/behavior within a certain time frame (unless it was unethical or illegal), and the student's failure to improve. A semester is the recommended time to allow for student improvement. Depending upon where the student is in their graduate studies, the case is made to the Early Support Team (Mentor-specific Admits), the Pharm/Tox Executive Committee (pre-comp exam students) or the Doctoral Committee. The student may be asked to meet with these committees separate from their mentor as they consider the case. If these committees concur with the mentor, the student then meets with the track director to discuss their options which include finding another lab, taking a terminal, non-thesis masters (if they have completed their course requirements), or filing an appeal (see section "Appeals Process").

## 6.16 APPEALS PROCESS

If a student wishes to appeal any of the aforementioned decisions or requirements the appeal should be made in writing to the Director of the Program Track (Pharmacology & Toxicology). The appeal will be reviewed by the program faculty and may include a collective meeting with the student. A decision by program faculty to accept or deny the appeal will be based on a majority vote. If the appeal is accepted, the program faculty may place additional requirements/deadlines on the student as a prerequisite for continuing in the program.

Students may also appeal any departmental decision to the Graduate College. Students who wish to appeal the decision of the program faculty must submit an appeal in writing to the Director of Graduate Studies in the College of Pharmacy. Also, while the Graduate College is available to discuss any academic concern, only grievances that allege violation of a specific University rule, regulation, policy or practice will be considered for formal review as stated below. A grievance procedure is available to graduate students who have complaints that: Allege violation of a specific University rule, regulation, policy or practice; Are not remediable by other university grievance policies and procedures; and are within the decision-making jurisdiction of the Graduate College. The Associate Dean of the Graduate College or other delegate of the Dean of the Graduate College (hereinafter "Associate Dean") shall determine whether a complaint is within the decision-making jurisdiction of the Graduate College. <https://grad.arizona.edu/policies/academic-policies/grievance-policy>

## 6.17 ANNUAL REPORTS

**Each student is required to electronically submit an Annual Report on or before June 1.** An email notice will be sent out from the Program Office at least one month prior to the Annual Report due date, for the student to fill out at: <http://gradstudent.pharmacy.arizona.edu/>

The Annual Report must be approved and signed by the Program track director (first year students) or the Research Advisor (all other students). Annual Reports for every year matriculating in the program are mandatory.

By June 15 the Executive Committee decides if each first year student should be sponsored for the following year. Second year students are evaluated for Advancement to Candidacy at the time of their comprehensive examination. If performance is substandard, the Executive Committee may recommend a probationary period, withdraw program sponsorship, seek dismissal, or may request the student to fulfill the requirements for a Master's degree. The Executive Committee will evaluate overall student performance in the Program to date. If performance has been satisfactory, approval will be granted.

The Annual Report will list courses taken and grades received, committee meeting(s) held, scientific meetings/conferences attended, abstracts and papers published, seminars and report presentations, honors, outside funding, and a succinct and lucid summary of research progress.

Graduate students are also required to prepare and submit a written Individual Development Plan (IDP) as part of their Annual Report. The IDP allows the graduate student to determine training goals, needs for professional development, and career objectives to be presented and discussed at the Annual Committee Meeting. The IDP is to be prepared according to AAAS guidelines and submitted online at: <http://myidp.sciencecareers.org/>

The Annual Report must be approved by the major advisor and track director before the year's work is considered complete. **Students who do not meet this deadline will receive a one-time letter requesting the information be provided immediately. Failure to meet performance criteria in any of these areas is grounds for recommendation of dismissal from the Program.**

## 6.18 QUALIFYING EXAMINATION

Satisfactory completion of the first two year's work constitutes passing of the **Qualifying Examination**. This entails that the student attains grades of no less than a "B" in core courses and maintains a grade point average of at least 3.0. Part of the evaluation includes the submission and approval of an **Annual Report** outlining his/her activities during that year.

## 6.19 PLAN OF STUDY

In conjunction with his/her major professor or advisor, each student is responsible for developing a Plan of Study during their first year in residence, to be submitted in GradPath no later than the student's third semester in residence. The Plan of Study identifies (1) courses the student intends to transfer from other institutions; (2) courses already completed at The University of Arizona which the student intends to apply toward the graduate degree; and (3) additional course work to be completed in order to fulfill degree requirements. The Plan of Study must have the approval of the student's major professor and department head (or Director of Graduate Studies) before it is submitted to the Graduate College.

## 6.20 COMPREHENSIVE EXAMINATION

The Comprehensive Examination consists of two parts: the written examination, and the oral examination. After required courses (except statistics) are completed, usually at the end of the second academic year, the comprehensive examination should be scheduled. **Students must complete the comprehensive examination within three (3) years from admission to the Program.** Each student's dissertation committee serves as the comprehensive examination committee.

### 1. WRITTEN EXAMINATION

The written portion of the examination consists of a research proposal. By June 1st, the student will have identified a topic and submit the title and abstract to their dissertation committee. The topic can be the

student's dissertation research. Once the topic is approved, a proposal is prepared in the format of the scientific portion of the National Institutes of Health F31 Individual Predoctoral Fellowship <https://grants.nih.gov/grants/guide/pa-files/PA-19-195.html>

The sections to be included are abstract; specific aims; and research strategy. Margins and font size are detailed on the NIH website. A maximum of 7 single spaced pages (1 page for specific aims and 6 pages for research strategy) are required, excluding references. The proposal is submitted to the Committee by August 1st.

The Committee decides if the proposal is satisfactory. Two revisions will be allowed if necessary. Once this occurs the student has passed the written portion of the comprehensive exam. Failure after the second revision will result in dismissal from the Ph.D. program.

### Eligibility

Only students who have completed all required core courses (except statistics), as listed in the Graduate Student Handbook, are eligible to take the exam. Students who have completed these requirements will receive notification of a comprehensive exam orientation meeting that will be held the end of March to explain the comprehensive exam process. This meeting will be conducted by the Program Track Director or other member of the Executive Committee.

## 2. ORAL EXAMINATION

Within three months of passing the Written Examination, the student will undergo the Oral Examination. The first part is a defense of the Research Proposal, while the second part is questions in the broad area of Pharmacology and Toxicology as well as the minor subject area. The student is expected to display scientific proficiency.

The faculty strongly emphasizes that the responsibility for the quality of the proposition, be it originality, approach, or significance, rests completely with the student. The student selects the area, prepares the written proposition, submits it to his/her advisory committee, and defends it at the oral. At no time should he/she seek nor obtain assistance from any person regarding a preliminary estimation of the defensibility of the proposal. At the time of the oral defense, the committee judges the acceptability of the proposition by the extent to which the student demonstrates scientific maturity, originality, and ability to explain and defend his/her proposal. A student may pass one part of the exam but fail the other part. If there is a full or partial failure the student is allowed a second attempt to pass the exam. The second attempt must be completed by the end of the next semester.

### 6.21 FAILURE OF THE SECOND ATTEMPT OF THE ORAL COMPREHENSIVE EXAMINATION

Students who fail a second attempt of the oral comprehensive examination are automatically dismissed from the Ph.D. Program. It is possible, with a recommendation from the comprehensive examination committee, to offer the student a terminal M.S. (non-thesis) degree option.

### 6.22 ADVANCEMENT TO CANDIDACY

When a student passes the comprehensive examination and completes all coursework on his/her Plan of Study, he/she advances to doctoral candidacy. At that time, the student's bursar account will be billed the candidacy fees of \$35. These are one-time fees and the student will not be billed again if the anticipated graduation date is changed.

After passing the Oral Comprehensive Exam, the student is required to submit the Committee Appointment Form in GradPath. The Final Oral Defense Examination cannot be scheduled until at least six months after the form is received. Deadlines for the submission of paperwork pertaining to doctoral

programs, as well as all forms, are available online from the Graduate College Website:  
<http://grad.arizona.edu/>

### **6.23 DISSERTATION**

This begins when the student picks a laboratory and advisor. Planning the research program begins in meetings with the Major Advisor and the Dissertation Committee. The Committee reviews the goals and experimental approaches summarized by the candidate, particularly in relation to the objectives set out in the dissertation proposal, and helps formulate and approve any changes or new plans deemed appropriate. At this time it may become necessary to increase the frequency of Dissertation Committee meetings. The candidate is expected to fulfill specific goals recommended by the Committee.

Permission to write the doctoral thesis and advance to the dissertation defense must be granted by the student's Dissertation Committee within 4-6 months of when the student expects to schedule and defend the doctoral thesis. It is strongly expected that every student will generate at least one first author, peer-reviewed, original research manuscript accepted for publication prior to the thesis defense. Failure to make sufficient progress towards a first author, original research publication may be used as grounds for the dissertation committee to deny permission to advance to the doctoral thesis. If a student does not defend his/her thesis within 6 months of receiving permission from the dissertation committee, he/she must meet with the committee again to explain the circumstances and ask for continued permission to schedule the thesis defense.

Preparation of the written dissertation follows the Graduate College rules, **Student's Manual for Theses and Dissertations** <https://arizona.app.box.com/v/grad-gsas-dissformat>. When the dissertation is written, the candidate submits a copy to each member of his/her committee **ten (10) working days prior to the final examination**. The Announcement of Final Examination must be filed with the Graduate Student Academic Services (GSAS) **seven (7) working days before the examination date**.

### **6.24 FINAL EXAMINATION**

Upon the completion of the dissertation, the candidate is to submit to a Final Oral Defense Examination. A student must be in good academic standing to schedule the defense. The examination focuses on the dissertation itself but can include general questioning related to the field(s) of study within the scope of the dissertation.

The exact time and place of this examination must be scheduled with the Graduate Student Academic Services (GSAS) at least 7 working days in advance. Announcement of Final Oral Examination form must be filed with GSAS. A format correct copy of the dissertation must be delivered by the candidate to each committee member at least ten (10) working days before the examination. The student should print out two (2) dissertation approval pages, and bring them to the defense. It is expedient to get all signatures at the defense.

The dissertation director presides over the examination. The examination is closed to the public, except for an initial seminar portion during which the student presents the dissertation and entertains questions.

There is no minimum time limit for the Final Oral Examination, but the entire proceedings may not exceed three hours. Members of the committee must be present for the entire examination.

### **6.25 LIMITATION ON TIME SPANS**

The Ph.D. degree with a major in Pharmacology and Toxicology usually requires approximately 4.5-5 years of education beyond the baccalaureate degree. As the success of laboratory experiments or the time

required for their completion cannot be predicted accurately, more time may be required for completion of degree requirements.

**Note: Graduate coursework credit, to be applicable toward a degree, must have been earned not more than five (5) years prior to the completion of the requirements for the degree. This includes graduate credit earned for a Master's degree, if applicable. The Graduate Council has instructed that petitions for time-limitation waivers should only be entertained under circumstances that are judged to be extraordinary and extenuating.** According to Graduate College policy, students must finish within 5 years of taking comps <https://grad.arizona.edu/gsas/degree-requirements/doctor-philosophy#time-limitation>

## **6.26 TIMETABLE, FORMAL DOCUMENTATION, AND DEADLINE DATES**

The following forms and deadlines are required by the Program Office and Graduate Student Academic Services. All forms are submitted in GradPath through the University of Arizona UAccess Student Center System. UAccess Student Center can be accessed from: <https://uaccess.arizona.edu/>

- a. Responsible Conduct of Research (1<sup>st</sup> month in residence)
- b. Code of Academic Integrity (1<sup>st</sup> month in residence)
- c. Doctoral Plan of Study (3<sup>rd</sup> semester in residence)
- d. Oral Comprehensive Examination Committee Form (3<sup>rd</sup> semester in residence; documenting the assembly of the faculty members that will conduct the Oral Comprehensive Exam covering members from major and minor programs. The Oral Committee Chair should be a PharmTox faculty member). After successful completion of the Oral Comprehensive Exam, a final Dissertation Committee is assembled based with minor modifications to accommodate program membership requirements.
- e. Announcement of Doctoral Comprehensive Exam (submit no later than one month prior to Oral Examination)
- f. Doctoral Dissertation Committee Appointment (submit no later than 6 months prior to defending). The Program recommends submitting the Committee Appointment form immediately following completion of the Oral Comprehensive Examination.
- g. Prospectus Proposal Confirmation (print from GradPath and take form to Oral Comp Examination)
- h. Announcement of Final Oral Defense (submit no later than one month prior to defense). A format correct copy of the dissertation must be given to each committee member, ten (10) working days before the examination.

## APPENDIX A

It is the duty of the advisor and the student that these forms are obtained and completed by the respective deadline. Forms can be obtained from the following link: <http://gradstudent.pharmacy.arizona.edu/>

### I. College of Pharmacy Graduate Programs Forms

- a. Pre-doctoral Time-line of Training (In your Welcome packet)  
The Graduate Program Coordinator will meet with the graduate student to review the forms and required timelines of the program.
- b. Student Annual Committee Report  
For every annual committee meeting the following form needs to be completed and signed by every committee member. Form at: <http://gradstudent.pharmacy.arizona.edu/>
- c. Annual Progress Report  
For every year, an Annual Progress Report has to be completed by the student, then reviewed and signed by the advisor, followed by submission to the Track Director. Submission must occur by June 1<sup>st</sup> using the following link <http://gradstudent.pharmacy.arizona.edu/>
- d. Written Comprehensive Examination Results Form (Written Comprehensive Portion)  
A student must obtain signatures from their committee once the research proposal has been approved. Form at: <http://gradstudent.pharmacy.arizona.edu/>
- e. Student Outcomes Assessment Form  
Members of the Comprehensive Exam Committee will fill out this form after the Oral Examination, and use it only as a measurement for the outcomes and not for the purpose of grading the Oral Comp Exam. The student will take one form for each committee member to the Oral Exam (included in the Oral Exam Packet from the Graduate Programs Office).