GRADUATE STUDENT HANDBOOK

PHD GRADUATE PROGRAM IN:

PHARMACOLOGY AND TOXICOLOGY
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 Catalog. 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 Council of the University. In those cases where the requirements are slightly different from those stated in the Graduate Catalog, the requirements in this Handbook pertain. 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 (http://grad.arizona.edu/).

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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Revised August 1, 2015
1.0 INTRODUCTION

The graduate program in Pharmacology and Toxicology has programs 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 non-voting graduate student representatives. 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 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.

![Organizational Structure Chart]

2.3 Executive Committee on Pharmacology and Toxicology

The Pharmacology and Toxicology Executive Committee consists of five voting faculty members, one non-voting program coordinator, and two non-voting Program graduate student representatives. 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

<table>
<thead>
<tr>
<th>Name</th>
<th>Phone</th>
<th>Email</th>
<th>Room</th>
</tr>
</thead>
<tbody>
<tr>
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<td>520-626-7470</td>
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<tr>
<td><strong>Program Track Director</strong></td>
<td></td>
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<td>Pharmacy Bldg Rm 409</td>
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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 are required to obtain permission from the Pharm-Tox Executive committee. *Indicates Associate faculty.

*Bowden, G. Timothy, PhD, Professor, Radiation Oncology*
Molecular aspects of chemical and physical carcinogenesis, mechanisms of oncogene activation and tumor suppressor gene inactivation.

*Camenisch, Todd, PhD, Associate Professor, Pharmacology & Toxicology*
Investigating the integration between extracellular matrix and growth factor receptor signaling during heart morphogenesis.

*Chapman, Eli, PhD, Assistant Professor, Drug Discovery & Development*
Our lab uses chemistry, biochemistry, biophysics, structural biology, and cell and molecular biology to discover targeted modulators of a diverse array of pathologically relevant targets.

*Chen, Qin, PhD, Professor, Pharmacology*
Molecular mechanisms of oxidative injury and adaptation, stress signal transduction pathways, stress gene expression, senescence, apoptosis and cardiac hypertrophy.

*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.

*Cherrington, Nathan, PhD, Director of Graduate Studies and Professor, Pharmacology & Toxicology*
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.
Futscher, Bernard W., PhD, Professor, Pharmacology & Toxicology
Functional genomics; molecular biology of cancer; cancer pharmacology.

*Hoyer, Patricia, PhD, Appointed Personnel, Physiology, Adjunct Professor Pharmacology & Toxicology
Female reproduction: mechanisms of hormone action; regulation of steroidogenesis.

Hulme, Chris D., PhD, Professor, Pharmacology & Toxicology
Discovery and development of novel anticancer 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), Flow chemistry, Multicomponent reactions (MCRs) and C-H bond activation methodologies utilizing hypervalent iodine reagents for the design of peptidomimetics.

Klimecki, Walter, PhD, Associate Department Head and Associate Professor, Pharmacology & Toxicology
My laboratory studies how the genes that people inherit from their ancestors set the stage for unique interactions with the environments that those people are exposed to throughout their life, to increase or decrease their susceptibility to disease. Those environmental exposures could be diverse, ranging from environmental toxicant chemicals to airborne bacterial contaminants to prescribed drugs. The combination of humans' diverse genetic backgrounds and equally diverse environmental exposures present both challenges and opportunities to understand individual variability in disease susceptibility.

Lau, Serrine, PhD, Professor, Pharmacology & Toxicology
Genomic and proteomic approaches to investigate ROS and chemical-induced cell injury and carcinogenicity; molecular mechanisms of prostanoid mediated cytoprotection; mass spectrometric application of protein profiling and tissue imaging.

*Lantz, R. Clark, PhD, Associate Department Head, Cellular and Molecular Medicine
Pulmonary toxicology of air pollutants, especially metals; effects of air pollutants on neonatal lung growth and development.

Li, Hong-Yu, PhD, Associate Professor, Drug Discovery & Development
Discovery and development of novel anticancer therapeutics; Development of a novel fragment-based drug discovery approach and synthetic methodologies to expedite the drug discovery process.

Monks, Terrence J., PhD, Department Head and Professor, Pharmacology & Toxicology
Molecular mechanisms of chemical-induced toxicities; stress response pathways and apoptotic/oncotic cell death; ROS-induced DNA damage and chromatin structure/function.

Ooi, Aikseng, PhD, Assistant Professor, Pharmacology & Toxicology
Molecular carcinogenesis; Mutation-driven transcriptional and metabolic reprogramming; Carcinogen-driven transcriptional and metabolic reprogramming; Computational biology.

Regan, John W., 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.

Smith, Catharine L., 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.

**Sun, Daekyu, PhD, Associate Professor, Drug Discovery & Development**
Discovery and development of novel anti-angiogenic agents targeting transcriptional activation of VEGF and HIF-1alpha genes; 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.

**Vaillancourt, Richard R., PhD, Associate Professor, Pharmacology & Toxicology**
Molecular and biochemical characterization of serine/threonine protein kinases that function as part of sequential protein kinase pathways.

**Jun Wang, PhD, Assistant Professor, Drug Discovery & Development**
Elucidating the drug resistance mechanism of influenza viruses; design and synthesis broad-spectrum and resistance-refractory antiviral drugs; studying virus-host interactions and immune responses; drug discovery and structural biology of ion channels; exploring peptide and miniprotein-based therapeutics.

**Wondrak, Georg, PhD, Associate Professor, Pharmacology & Toxicology**
Reactivity-based drug discovery targeting the redox Achilles heel of skin cancer.

**Yang, Danzhou, PhD, Professor, Drug Discovery & Development**
DNA and DNA interacting proteins as potential anticancer drug targets. Structure-based rational drug design.

**Zhang, Donna, 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. The Main Library and the Science Library, both on the main campus, hold extensive collections of general and scientific periodicals and books. The Health Sciences Library is located in the Arizona Health Sciences Center. In addition to its holdings of pertinent periodicals and books, the library provides an excellent array of valuable services, including computerized bibliographic searches, state-of-the-art electronic information retrieval services with related on-line and off-line nationwide linkups, and access to a vast number of online journals. A large selection of supplemental audio-visual teaching aids is available in the media section.

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 40 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://toxcenter.pharmacy.arizona.edu/
4.0 GENERAL INFORMATION

4.1 Student Responsibilities

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.

4.2 Orientation

All new students are required to attend the Program’s Orientation held prior to the first day of classes.

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 till 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 NetID and UA Email Account, and College of Pharmacy Email/Computer 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.
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 miscellaneous fees. Financial assistance for M.S. students is dependent on the availability of funds.

4.6 Graduate Assistant/Associate Stipend Levels and Benefits 2015–2016

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<thead>
<tr>
<th>FISCAL</th>
<th>50% FY</th>
<th>TUITION WAIVER FALL/SPRING</th>
<th>100% FALL/SPRING REGISTRATION REMISSION</th>
<th>STUDENT INSURANCE FULL YEAR</th>
</tr>
</thead>
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<tr>
<td>Graduate Assistant I (All 1st-Year Students) Late start in August</td>
<td>$21,300 Prorated</td>
<td>$18,322</td>
<td>$11,040</td>
<td>$2,308</td>
</tr>
<tr>
<td>Graduate Assistant II (2nd-Year Students, except Ph.D. with M.S.)</td>
<td>$23,194</td>
<td>$18,322</td>
<td>$11,040</td>
<td>$2,308</td>
</tr>
<tr>
<td>Graduate Associate I (2nd-Year Student, with M.S. or Pharm.D.)</td>
<td>$23,767</td>
<td>$18,322</td>
<td>$11,040</td>
<td>$2,308</td>
</tr>
<tr>
<td>Graduate Associate II (Ph.D. students completed Prelim Exam)</td>
<td>$24,238</td>
<td>$18,322</td>
<td>$11,040</td>
<td>$2,308</td>
</tr>
</tbody>
</table>

4.7 Graduate Assistantships/Associateships

Please refer to the Graduate College GA Hiring Manual for complete details regarding your GA. http://grad.arizona.edu/financial-resources/ua-resources/employment/ga-manual

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/Grad.

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.
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. Prospective students applying for conditional admission must meet all Graduate College requirements except for the minimum 550 TOEFL requirement (or 213 in the computerized version or 79 in the IBT version).

Conditional Admission requires that the student apply to and enroll at the UA Center for English as a Second Language (CESL) at their own expense (or their sponsor’s) with the expectation of achieving TOEFL-equivalent English proficiency within one year. The initial 1-20 will be generated by CESL to allow the student to attend CESL classes. Once CESL certifies that the student has achieved English proficiency at the TOEFL minimum, he or she will be admitted as a regular standing student.

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 Executive Committee 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, anatomy, 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. 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 firm 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. At least three (3) members from the major and (1-2) from the minor field and is chaired by the research advisor. The research advisor discusses membership of the dissertation committee with the student and recommends the composition of the dissertation committee to the Executive Committee which may modify committee membership. Faculty members of the dissertation committee are 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 first research committee meeting should take place prior to the student taking the written portion of the comprehensive examination in order to discuss their research proposal which is due June 1st. After this first meet 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. It is recommended that the student have brief notes from the meeting recorded on the dissertation committee meeting form: http://www.pharmacy.arizona.edu/programs/graduate/documents/CommitteeMeeting.doc
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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCOL602</td>
<td>General and Systems Toxicology</td>
<td>3</td>
</tr>
<tr>
<td>PCOL630a</td>
<td>Cellular Communications &amp; Signal Transduction</td>
<td>3</td>
</tr>
<tr>
<td>or PCOL630b</td>
<td>Cellular Communications &amp; Signal Transduction</td>
<td></td>
</tr>
<tr>
<td>PCOL571a</td>
<td>Pharmacology I</td>
<td>4</td>
</tr>
<tr>
<td>PCOL571c</td>
<td>Pharmacology II</td>
<td>3</td>
</tr>
<tr>
<td>EPI576a</td>
<td>Biostatistics or</td>
<td>3</td>
</tr>
<tr>
<td>PCOL509c</td>
<td>Statistics for Research</td>
<td></td>
</tr>
<tr>
<td>MCB695e</td>
<td>Science, Ethics and Society or</td>
<td>1</td>
</tr>
<tr>
<td>SPH 649</td>
<td>Survival Skills and Ethics</td>
<td>3</td>
</tr>
<tr>
<td>PCOL696a</td>
<td>Student Seminar (1 credit/semester)</td>
<td>4</td>
</tr>
<tr>
<td>PCOL695a</td>
<td>Research Conference (register each semester 2 units)</td>
<td>4</td>
</tr>
<tr>
<td>PCOL586a</td>
<td>Lab Rotation (2 credits per rotation first year)</td>
<td>6</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>31-33</td>
</tr>
</tbody>
</table>

Electives – to equal 36 credits

Need enough units from the following list of electives to total 36 for the major.

ELECTIVE COURSES

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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSIO 511</td>
<td>Physiology/Biomed</td>
<td>3</td>
</tr>
<tr>
<td>PCOL550</td>
<td>Drug Metabolism and Disposition</td>
<td>2</td>
</tr>
<tr>
<td>PCOL 601a</td>
<td>Epigenetics in Development and Disease</td>
<td>1</td>
</tr>
<tr>
<td>PCOL601b</td>
<td>Proteomics</td>
<td>1</td>
</tr>
<tr>
<td>PCOL630a</td>
<td>Cellular Communications &amp; Signal Transduction</td>
<td>3</td>
</tr>
<tr>
<td>or PCOL630b</td>
<td>Cellular Communications &amp; Signal Transduction</td>
<td></td>
</tr>
<tr>
<td>PCOL 631</td>
<td>Pharmacogenetics/Pharmacogenomics</td>
<td>2</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

MINOR (9)

DISSERTATION (18)
6.4 Laboratory Rotations

Each first year student must participate in at least three (3) research laboratory rotations (PCOL 586a,b). Each rotation is two credit hours. At the end of each rotation, students must submit the rotation evaluation form to the graduate program office (forms are available on the Pharm-Tox website and through the program office). Students who do not submit the evaluation form will receive a grade of incomplete. UA PharmD/Ph.D. students will be required to complete two (2) rotations if they have not done so during their PharmD studies. 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. 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.

Rotation Schedule-Start Dates
1st: August 24 - October 30, 2015
2nd: November 2, 2015 – February 12, 2016
3rd: February 15 – April 22, 2016
4th: April 25 – June 10, 2016 (optional) Students who have selected a laboratory after the 3rd rotation may start in the permanent laboratory.

6.5 Seminar PCOL 696A (Wednesday, 12:00 – 1:00 p.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 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 a presentation of a 30-40 minute scientific seminar with a ten-minute question and answer session. Required components of organizing and presenting the seminar 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 evaluator are asked to meet immediately after the presentation for a private critique once the evaluator has had an opportunity to review attendee feedback. The mentor of the student will also be provided the evaluations.

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

The equivalent of at least six semesters of full-time graduate study is required for the Ph.D. 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). Six units of 400-level credit taken at The University of Arizona may be used in the minor but will not receive graduate credit or be calculated in the graduate grade-point average. 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 12 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 courses must first submit a request form to the Graduate College (http://grad.arizona.edu/forms) 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 the UA homepage: (http://www.arizona.edu). Contact the Program office for registration of courses that are not open to web registration.

6.8 Graduate Assistants 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 twelve (13) units of credit for the academic semester and one (1) unit each summer session. Students completing their degree in an academic semester may register for less than (13) 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 or summer 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.
### 6.10 Example Course Schedule Ph.D. in Pharmacology and Toxicology

<table>
<thead>
<tr>
<th>FALL - FIRST YEAR</th>
<th>SPRING - FIRST YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course</strong></td>
<td><strong>Course</strong></td>
</tr>
<tr>
<td><strong>Biochemistry Deficiency</strong></td>
<td><strong>Biochemistry Deficiency</strong></td>
</tr>
<tr>
<td><strong>PCOL 602a Gen. &amp; Systems Toxicology</strong></td>
<td><strong>PCOL 571c Pharmacology II</strong></td>
</tr>
<tr>
<td>Tues/Thurs: 2:30 – 4 PM</td>
<td>3</td>
</tr>
<tr>
<td><strong>PCOL 571a Pharmacology I, or equivalent</strong></td>
<td><strong>PCOL 630a Cell Comm+Sign Transdct OR PCOL 550 Drug Metabolism</strong></td>
</tr>
<tr>
<td>M/W: 9-9:50 AM and T/R: 10-10:50 AM</td>
<td>4</td>
</tr>
<tr>
<td><strong>EPID 576a Biostats in Public Health</strong></td>
<td><strong>EPID 576A Biostats (ONLINE) in Public Health</strong></td>
</tr>
<tr>
<td>(can be taken in fall of year 2) OR Elective</td>
<td>(can be taken in spring) OR <strong>PCOL 509C Statistics, or elective</strong></td>
</tr>
<tr>
<td>T/R: 12:30 – 1:45 PM</td>
<td>3</td>
</tr>
<tr>
<td><strong>PCOL 696a Student Seminar</strong></td>
<td><strong>PCOL 696a Student Seminar</strong></td>
</tr>
<tr>
<td>W: 12-12:50 PM</td>
<td>1</td>
</tr>
<tr>
<td><strong>PCOL 586a Lab Rotation</strong></td>
<td><strong>PCOL 586a Lab Rotation</strong></td>
</tr>
<tr>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td><strong>PCOL Fall Course elective</strong></td>
<td><strong>PCOL 601a Epigenetics in Dev. &amp; Disease</strong></td>
</tr>
<tr>
<td>2-3</td>
<td>3</td>
</tr>
</tbody>
</table>

PCOL 900 research (if needed to meet unit minimum)

| Total | 15-16 | Total | 15-17 |

** 400 level Biochemistry to be approved by the Pharmacology & Toxicology Program Director. Biochemistry 400 level courses are considered deficiency coursework and will not count toward your degree unit requirements.

*Ethics requirement may be filled by taking either MCB 695e or SLHS 649 Survival Skills and Ethics. MCB 695e and SPH 649 are offered in the spring semester; PHCL595b is offered in the fall Semester.

***Statistics requirement may be filled by taking either EPID 576a biostatistics or MATH 509c Statistics for research

**Fall Course Electives**
- PCOL 601a Epigenetics in Dev. & Disease
- PCOL 601b Proteomics
- PCOL 630b Cell Comm+Sign Transdct
- PCOL 631 Pharmacogenetics

**Spring Course Electives**
- PCOL 550 Drug Metabolism & Disposition
- PCOL 630a Cell Comm+Sign Transdct
- PSIO 511 Physiology/Biomed
6.11 Minor Requirements

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.

Please note that some minors require 6 of the 9 units to be taken prior to the comprehensive oral exam.

6.12 Suggested Minors for Pharmacology and Toxicology Majors (minimum of 9 units)

1. Pharmacology & Toxicology (Integrated minor)
2. Physiology
3. Molecular and Cellular Biology
4. Microbiology and Immunology
5. Cell Biology and Anatomy
6. Cancer Biology
7. Neuroscience
8. Medicinal & Natural Products Chemistry
9. Pharmaceutics
10. Medical Pharmacology
11. Biochemistry

6.13 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 Program Office and the Graduate Program Chairperson, before proceeding with a minor. A student may minor in Pharmacology and Toxicology by completing nine (9) units of coursework listed below:

- PCOL 602 General and Systems Toxicology 3 units
- PCOL 601a Epigenetics in Development & Disease 1 unit
- PCOL 601b Proteomics 1 unit
- PCOL 630a Cellular Comm. & Signal Transduction 3 units
- PCOL 630b Cellular Comm. & Signal Transduction 3 units
- PCOL 571a Pharmacology I 4 units
- PCOL 571c Pharmacology II 3 units
- PCOL 550 Drug Metabolism and Disposition 2 units
- PCOL 631 Pharmacogenetics/Pharmacogenomics 2 units
6.14 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.

6.15 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 converted to non-degree status. Programs may allow students to take additional course work while in non-degree status. In order to graduate, the student must apply for readmission to the Graduate College through their graduate department. Readmission is not guaranteed.

6.16 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, with two negative votes sufficient for termination.

- **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 to the Graduate Program Coordinator, on or before June 1. The Annual Report must be approved and signed by the graduate track director (first year students) or the Research Advisor (all other students) prior to submission to the Program office. 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 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.

- **Dissertation/Thesis Committee Meetings** - All students are required, after the formation of a dissertation/thesis committee, to have at least one committee meeting per year while in the Program.
- **Completion Guidelines** – Students will complete the following according to the time frame listed below.

| YEAR 1 And Summer | • Complete at least Three Laboratory Rotations  
| | • Complete Deficiency Coursework (if applicable)  
| | • Complete First Year Core Coursework  
| | • End of First Year - Selection of Mentor/Research Advisor  
| | • End of First Year – Begin Doctoral Research  
| YEAR 2 | • Continue Doctoral Research  
| | • Complete Second Year Core Coursework  
| | • Submit Doctoral Plan of Study to Program Office – Fall Semester  
| | • Select Dissertation Committee  
| | • Present Seminar – Spring Semester  
| | • Attend Meeting to Discuss Comprehensive Exam (March)  
| | • Schedule 1st Research Committee Meeting  
| | • Identify & Obtain Approval for Written Proposal Topic by June 1st  
| | • Submit Written Portion of Comprehensive Examination by Aug. 1st  
| YEAR 3 | • Continue Doctoral Research  
| | • Pass Written & Oral Comprehensive Examination – Fall Semester  
| | • Submit Committee Appointment Form in GradPath  
| | • Present Seminar – Fall Semester  
| | • Dissertation Committee Meeting  
| YEARS 4 and 5 | • Present Seminar – Fall Semester  
| | • Continue Doctoral Research  
| | • Dissertation Committee Meeting  
| | • Pass Final Examination (Dissertation Defense)  
| | • Identify Employment Opportunities  

**6.17 Appeals Process:**

If a student wishes to appeal any of the aforementioned 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 to accept the appeal of the program faculty will be based on a majority vote. The program faculty may place additional requirements/deadlines on the student as a prerequisite for continuing in the program. Students who wish to appeal the decision of the program faculty must submit an appeal in writing to the Associate Dean of the Graduate Program in the College of Pharmacy.

**6.18 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 is grounds for dismissal from the Program.** All students will submit an annual report to the Graduate Program Coordinator, on or before June 1.
6.19 Annual Reports

Each student is required to submit an Annual Report to the Program office, College of Pharmacy, room 336, 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, which will include an attachment of the Annual Report form for the student to fill out.

The Annual Report must be approved and signed by the Program track director (first year students) or the Research Advisor (all other students) prior to submission to the Program office. 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, abstracts and papers published, seminars and report presentations, honors, outside funding, and a succinct and lucid summary of research progress. The Annual Report must be approved by the Executive Committee 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 or the student will be dropped from the Program for failure to meet Program degree requirements.

6.20 Qualifying Examination

Satisfactory completion of the first two year's work constitutes passing of the Qualifying Examination. This entails that the student attain grades of no less than 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.

6.21 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 filed with the Graduate College 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.

6.22 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.
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 will be related to the student’s research, but NOT the dissertation research. Once the topic is approved, a proposal is prepared according to the format of the National Institutes of Health: http://grants1.nih.gov/grants/funding/phs398/phs398.html

The sections to be included are abstract; specific aims; and research design. Margins and font size are detailed on the NIH website. A minimum of 11 single spaced pages and a maximum of 12, excluding references are required. Data from published literature will be used in place of preliminary data generated by the student. 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. 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.

Oral Examination

Within four weeks of passing the Written Examination, the student will undergo the Oral Examination. The first is a defense of the Research Proposal, while the second 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.

6.23 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 convert the student to the M.S. Program. The student will be required to complete an M.S. thesis.
6.24 Advancement to Candidacy

When the student has an approved doctoral Plan of Study on file, has satisfied all course work, language, and residence requirements, and passed the written and oral portions of the Comprehensive Examination, he or she will automatically advance to candidacy. The Candidacy fee, the dissertation processing fee, and the archiving fee (total of $135) will be assessed when the student passes the Oral Comprehensive Exam.

After passing the Oral Comprehensive Exam, the student is required to submit the Committee Appointment Form to the Graduate Degree Certification Office. 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/

6.25 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.

Preparation of the written dissertation follows the Graduate College rules, Student's Manual for Theses and Dissertations (http://grad.arizona.edu/academics/degree-certification/diss-theses/manuals). 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 Degree Certification seven (7) working days before the examination date.

6.26 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 Degree Certification Office at least 7 working days in advance. Announcement of Final Oral Examination form must be filed with Graduate Degree Certification. 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.
6.27 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. Students who enter the Program with advanced degrees (M.S., MD, Pharm.D., D.V.M.) should complete requirements for the Ph.D. degree in less than four (4) years.

Note: Graduate coursework credit, to be applicable toward a degree, must have been earned not more than ten (10) 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.

6.28 Timetable, Formal Documentation, and Deadline Dates

The following forms and deadlines are required by the Program Office and Graduate Degree Certification. All forms can be downloaded from the Graduate College website: (http://grad.arizona.edu/)

**Doctoral Plan of Study** - The Doctoral Plan of Study is submitted to Graduate Degree Certification no later than the third semester of residence at The University of Arizona.

**Results of the Oral Comprehensive Examination** – This form is filled out on-line through the Graduate College forms website. Print out the form and take it to your oral exam.

**Committee Appointment form** - After satisfactory completion of the Comprehensive Examination, the Committee Appointment form is completed, and must be submitted no later than six (6) months before the Oral Defense Examination (Dissertation Defense) is scheduled. The Program recommends submitting the Committee Appointment form immediately following completion of the Oral Comprehensive Examination.

**Announcement of Oral Defense Examination** - The Announcement of Oral Defense Examination must be submitted to Graduate Degree Certification no later than seven (7) working days before the date of the Final Oral Examination. A format correct copy of the dissertation must be given to each committee member and the Program Office, ten (10) working days before the examination.