



THE UNIVERSITY OF ARIZONA®

GRADUATE STUDENT HANDBOOK

PHARMACEUTICS AND PHARMACOKINETICS

GRADUATE PROGRAM TRACK

PHARMACEUTICAL SCIENCES

PH.D. DEGREE

This handbook outlines the philosophy and requirements of the Graduate Degrees offered in the disciplines of Pharmaceutics 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 Pharmaceutics and Pharmacokinetics outlined herein are under the authority and consistent with the rules and guidelines set forth by the Graduate Council 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 Pharmaceutics Program degree requirements are only outlined in this document; consult the current Graduate College Catalog for complete details: <https://catalog.arizona.edu/>

Attainment of a graduate degree in Pharmaceutics 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 Pharmaceutics leads to the Doctor of Philosophy degree in Pharmaceutical Sciences. Well-funded research opportunities and the strong multidisciplinary nature of the program provide students with a highly interactive and personalized approach to research and education in Pharmaceutics and Pharmacokinetics.

Master of Science (M.S.) Degree in Pharmaceutical Sciences

The Pharmaceutics and Pharmacokinetics Track of the Graduate Program in Pharmaceutical Sciences 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 (non-thesis option) alongside or 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 Pharmaceutics and Pharmacokinetics Ph.D. program.

Doctor of Philosophy (Ph.D.) Degree in Pharmaceutical Sciences

The Pharmaceutics and Pharmacokinetics Track of the Graduate Program in Pharmaceutical Sciences offers a Ph.D. degree in pharmaceutical sciences. Students in this program must take courses in the major area as well as one of the several possible minor areas of study.

The mission of this program is to educate and prepare students for work in the pharmaceutical industry and in academia. The specific fields of study are physical Pharmaceutical Chemistry and Pharmacokinetics. These disciplines of pharmaceutics and pharmacokinetics are unique and exist only in Colleges of Pharmacy. The average time to graduation is approximately five and one half years.

1.1 BACKGROUND

Pharmaceutics deals with the design and development of pharmaceutical dosage forms. At the University of Arizona, emphasis is placed on non oral (i.e., topical, injectable, and inhalation) dosage forms and novel drug delivery systems. Formulations are developed that maximize the bioavailability and/or the stability of the active ingredient. This involves the study of the factors that govern solubility in aqueous and non-aqueous vehicles. It also involves the development of stability indicating assays and the study of the effects of formulation components on physical and chemical stability.

2.0 THE GRADUATE PROGRAM ORGANIZATION

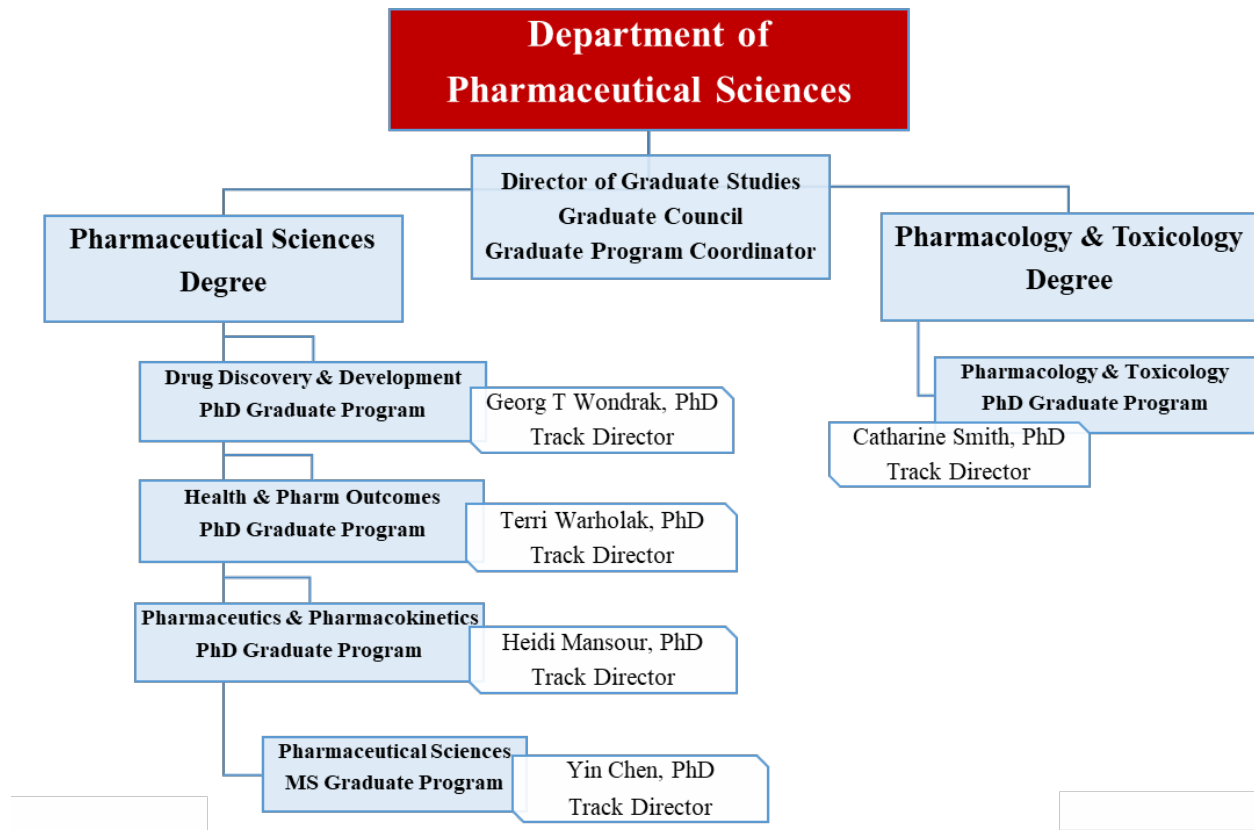
2.1 PHILOSOPHY AND GOALS

A primary goal is to prepare students to excel in Pharmaceutics by providing customized curriculum and constant personalized advising. In addition, the faculty provides service, education, and research in the areas of Pharmaceutics and Pharmacokinetics to best serve the students (professional and graduate), the public and professional communities.

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 from each program track. The Council formulates policies and coordinates activities of the graduate program for all disciplines within the College of Pharmacy, including the Pharmaceutics 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 PHARMACEUTICS EXECUTIVE COMMITTEE

The Pharmaceutics Executive Committee is comprised of the Pharmaceutics Program Faculty. One faculty member serves as the Program Track Director and sits on the College Graduate Executive Council. The Pharmaceutics faculty formulates policies and coordinates activities of the Program, evaluates and selects applicants for admission to the program, and considers curriculum matters.

Committee Members

Name	Phone	Email	Room
Dr. Samuel Yalkowsky	520-626-1289	yalkowsky@pharmacy.arizona.edu	Pharmacy Bldg Rm 426A
Dr. Heidi Mansour Track Director	520-626-2768	mansour@pharmacy.arizona.edu	Pharmacy Bldg Rm 412
Dr. Jianqin Lu	520-626-1786	lu6@pharmacy.arizona.edu	Pharmacy Bldg Rm 422

2.4 GRADUATE STUDENT REPRESENTATIVES

Graduate student representatives are elected by the graduate student body of the Program in Pharmaceutics for two year terms. The representatives serve as an official liaison between the students and faculty of the Program with one representative being a non-voting member of the Executive Council. The representatives are responsible for organizing graduate student participation in Program endeavors, as well as serving on Program committees in an advisory capacity. The student representatives are not included in the evaluation of student performance or admitting students into the program. 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 faculty with whom students may pursue their research.

Samuel Yalkowsky, Ph.D. He is currently involved in basic research on the relationships between chemical structure and physical phenomena such as solubility, partitioning, and melting. He has developed the state of the art algorithm for the estimation of the aqueous solubility of organic compounds. He has also made great progress in the development of an algorithm for the estimation of the melting points of organic compounds. Dr. Yalkowsky co-authored two papers that won the Ebert Prize for the best scientific paper in the Journal of Pharmaceutical Sciences. He received the University of Arizona Graduate Teaching and Mentoring Award in 2001.

Heidi Mansour, Ph.D. received her Ph.D. from the University of Wisconsin-Madison, and conducted a postdoctoral fellowship at University of North Carolina-Chapel Hill School of Pharmacy. Dr. Mansour is Associate Professor (Tenured), Department of Pharmaceutical Sciences and in Pharmacology and Toxicology, in the College of Medicine (Division of Translational and Regenerative Medicine), in the UAHS [Clinical Translational Sciences](#) graduate program, and in the [BIO5 Institute](#). Other appointments include Track Director, Pharmaceutics and Pharmacokinetics; Research Member, [NCI Comprehensive Cancer Center](#); affiliate faculty member, [Institute of Environment](#) and Director, PharmD/PhD dual-degree program. 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. Multifunctional polymeric phospholipid (lipopolymeric) self-assemblies are optimized for targeted drug delivery, nanomedicine, and multifunctional microparticles

and nanoparticles in the solid-state as dry powder inhalation aerosols in the targeted treatment and prevention of several pulmonary diseases. These microparticulate/nanoparticulate dry powders, which are targeted directly to the lung as dry powder inhalers, are biocompatible, biodegradable, mucopenetrating, and provide sustained drug release. Editorial Advisory Board member to several journals, Mansour has authored over 80 peer-reviewed journal publications, 13 book chapters, 2 co-edited books, and several patents/invention disclosures.

Jianqin Lu, BPharm, Ph.D. Dr. Lu received his Ph.D. in Pharmaceutics from the University of Pittsburgh. The overarching goal of the Lu lab is to apply synthetic chemistry, nanoparticle engineering, and tumor immunology to develop efficacious nanotherapeutics to address the pressing unmet needs in current cancer therapy. The Lu Lab's expertise in Pharmaceutics, Drug Delivery, Nanomedicine and Tumor Immunology paves the way to develop transformative and clinically translatable nano-enabled immunotherapeutics for combatting cancers. Dr. Lu was the recipient of the Norman R. and Priscilla A. Farnsworth Award at School of Pharmacy, University of Pittsburgh, and USHHS Ruth L. Kirschstein Institutional National Research Service Award in Tumor Immunology among others. He has published 28 research articles, 1 book chapter, and 2 patent applications (one of which has been licensed) as well as been the invited speaker in the prestigious 41st Controlled Released Society Annual Meeting & Exposition.

3.0 PHYSICAL RESOURCES AND FACILITIES

3.1 EQUIPMENT RESOURCES

The Pharmaceutics faculty laboratories and student work areas are housed in the Skaggs College of Pharmacy building. Availability of modern scientific instruments is crucially important to research and graduate education programs. We are fortunate to possess ample instrumentation to conduct research on multiple levels of biological and physical science research. Each investigator's laboratory is equipped with specialized instrumentation required for research in their particular field.

The Pharmaceutics laboratories are especially well equipped with instruments necessary for physical chemical analysis, including multiple high performance liquid chromatographs, a modulated DSC/TGA, spectrophotometers, time of flight particle sizer, gas chromatographs, and a mass spectrometry facility. All laboratories have networked for all computers and data processing systems. All graduate students have their own computer and desk.

3.2 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.

3.3 EXPERIMENTAL ANIMALS

The availability of high quality experimental animals is often employed in modern research in Pharmaceutics and Pharmacokinetics. In order to perform animal research a 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.

3.4 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.

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

The Graduate Program in Pharmaceutics 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.

4.1.1 Instructional Services Assistant

Graduate students in the College of Pharmacy are required to serve 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 - BSPS) 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 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. Even though the charges for health insurance show up on your student account, the university will off-set the charge.

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 NETID, 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.

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 graduate assistantships or traineeships is available to all first-year Ph.D. students admitted into the Program through ABBS. 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

FISCAL	50% FY	TUITION WAIVER FALL/SPRING	100% FALL/SPRING REGISTRATION REMISSION	STUDENT INSURANCE FULL YEAR
Graduate Assistant I (All 1st-Year Students) Late start in August	Refer to ABBS			
Graduate Assistant II And beyond	\$27,000	\$20,127	\$11,938	\$2,725

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.***

4.9 CHILD CARE SUBSIDIES AND FAMILY FRIENDLY INFORMATION

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 TRANSFER OF COURSEWORK

In order to transfer coursework, an evaluation of transfer credit form must be submitted to the Graduate College in GradPath, before the end of the 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; departments must still decide which courses should be part of the Program of Study.

The transfer of coursework must also be approved by the student's major advisor. The courses being transferred will be listed on the Doctoral Plan of Study, which requires the major advisor's signature verifying his/her approval of the courses being transferred as well as the courses required for the major.

The Doctoral Plan of Study is to be submitted in GradPath no later than the second year in residence.

6.0 Ph.D. PROGRAM IN PHARMACEUTICS

6.1 Administration

If a student does not have a specific advisor identified upon enrolling the first year then the Pharmaceutics Track Director will help the first year student plan his/her program with an emphasis on the first year's courses. 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 pharmaceutics, pharmacokinetics, chemistry, material science, pharmacology, toxicology, biochemistry to diversify his/her program. The Major 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 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.

6.3 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.

6.4 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 (PHSC 900). After completion of the comprehensive examination Ph.D. students should enroll for dissertation (PHSC 920).

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.

6.5 COURSES FOR PHARMACEUTICS MAJOR

A minimum of 36 units of course work in the area of the major subject including 4 seminar credits and a minimum of 4 lab meeting credits must be completed. In addition, 9 units of course work in the minor subject, and 18 units of dissertation must be completed. All research and dissertation units are registered under PHSC.

PHSC 502	Pharmaceutics	3
PHSC 501	Introduction to Pharmacology, Drug Discovery & Pharmaceutics	4
PHSC 603	Topics in Pharmaceutics	2
PHSC 511	Topics in Pharmaceutical Solids, Nanotechnology and Solid-State Particle Engineering Design in Drug Delivery	3
PHSC 505	Current Techniques in Pharmaceutical Sciences	3
PHSC 596c	Pharmaceutics Research Lab Meeting	4
PHSC 696a	Seminar	4
BIOS 576a	Bio Statistics	3
MCB 695e	Science, Society and Ethics	1
	OR	
PHCL 595b	Science Writing, Presentation & Bioethics	2

Choose three elective courses from the list below:

PCOL 530	Introduction to Molecular Therapeutics and Drug Discovery	3
ATMO 596b	Air Pollution II: Aerosols	3
CHEE 572	Interfacial Chemistry of Biomolecules in Environmental Systems	3
CHEM 502a	Introduction to Organic Reaction Mechanisms	3
CHEM 527	Analytical Separations	2-3
MSE 503	Applied Surface Chemistry	3
MSE 512	Physical Chemistry of Materials	3

* Credits do not count towards major

MINIMUM TOTAL FOR MAJOR	36
MINOR	9
DISSERTATION	18

6.6 LABORATORY ROTATIONS

ABBS graduate program members: follow guidelines and procedures as applicable.

Each first-year student must participate 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. 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, development of laboratory skills, attitude toward the research project, and a final written report prepared by the student

Please refer to the schedule as specified by ABBS in your respective first year of graduate study.

6.7 SEMINAR (PHSC 696A) SEMESTER (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 PHSC 696a for the fall and spring semesters for their term of full-time residence in the Program.** Grades are calculated based on attendance. 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.

PHSC 696a requires presentation of a 15-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 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.

6.8 MINOR REQUIREMENTS FOR PHARMACEUTICS MAJORS

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 Pharmaceutics Executive Committee and Track Director of the Program.

Suggested Minors (minimum of 9 units)

1. Interdisciplinary
2. Chemistry
3. Biochemistry
4. Pharmacology
5. Drug Discovery and Development
6. Materials Science and Engineering
7. Cancer Biology
8. Applied Biosciences

6.9 ANNUAL REPORTS

Annual Reports need to be submitted to: <http://gradstudent.pharmacy.arizona.edu/> on or before June 1. 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.

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 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.

6.10 SCIENTIFIC MEETINGS

As part of the educational process, students in training will be encouraged to attend national scientific meetings as travel support permits. Priority for travel support will be given to students presenting communications at national meetings such as American Association of Pharmaceutical Scientists (AAPS), the Controlled Release Society (CRS), the American Chemical Society (ACS), NanoDDS, the American Institute of Chemical Engineers (AIChE), the American Thoracic Society (ATS), the International Society for Aerosols in Medicine (ISAM), and Gordon Conferences. Students should discuss participation in meetings and travel support with their Research Advisors. Students may also apply for travel funds available from the Graduate College.

6.11 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.

6.12 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 on or before June 1. The Annual Report must be approved and signed by the graduate track director (first year students) or the Major Research Advisor (all other students) for submission to: <http://gradstudent.pharmacy.arizona.edu/> Annual Reports for every year matriculating in the program are mandatory.
- Sponsorship - By June 15 the Pharmaceutics 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 has been satisfactory, approval will be granted. 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.
- Dissertation Committee Meetings – After the second year, all students are required, after the formation of a dissertation 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	TIME-FRAME GUIDELINES
YEAR 1 And Summer	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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
YEAR 3	<ul style="list-style-type: none"> • Continue Doctoral Research • Schedule Written & Oral Comprehensive Examination • Submit Committee Appointment Form • Present Seminar – Spring Semester • Dissertation Major Committee Meeting
YEARS 4 and 5	<ul style="list-style-type: none"> • Present Seminar – Spring Semester • Continue Doctoral Research • Dissertation Major Committee Meeting • Pass Final Examination (Dissertation Defense)

	<ul style="list-style-type: none"> • Identify Employment Opportunities
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6.13 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 (Pharmaceutics). 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 may also appeal any departmental decision. 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. For additional information regarding appeals and complaints, please refer to the Graduate College webpage here: <https://grad.arizona.edu/policies/academic-policies/summary-grievance-types-and-responsible-parties>

6.14 RESEARCH ADVISOR AND DISSERTATION COMMITTEE

Prior to the selection of a Major Research Advisor, the student should 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.

After these preliminary interviews and research laboratory 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 Track Director of the Program before the end of the Spring Semester. The Major 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 Pharmaceutics Executive Committee is required.

At the time of Major Research Advisor selection, or shortly thereafter, a Dissertation Committee is formed. The Dissertation Committee consists of at least four (4) members. At least three (3) members from the Program faculty, and at least one (1) from the minor field. The Dissertation Committee is chaired by the Major Research Advisor. The Major Research Advisor discusses membership of the Dissertation Committee with the student and recommends the composition of the Dissertation Committee to the Pharmaceutics 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 Dissertation Committee will meet with the student at least once a calendar year (June 1 - May 31) to review progress in coursework and research. Additionally, the Dissertation Committee will be helpful in focusing the objectives of the proposed dissertation as well as limiting the scope. It is strongly recommended that the student meet with the dissertation committee shortly before scheduling the final defense. **You must indicate in your Annual Report the date of your annual meeting with your committee members.**

6.15 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.

6.16 COMPREHENSIVE EXAMINATION

The Comprehensive Examination consists of two parts: the written examination, and the oral examination. After required courses 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 and one half (3.5) years from admission to the Program.** Each student's dissertation committee serves as the comprehensive examination committee. Only students who have completed all required core courses, as listed in the Graduate Student Handbook, are eligible to take the exam.

Written Examination

Each student will take a written exam from each advisor for the major committee. Minor committee members are also given the opportunity to test the student via a written exam; however, minor committee members can opt to waive this exam. The written exams will cover material germane to the coursework a student has taken from a faculty member. Students must successfully pass each exam prior attempting the oral examination.

Oral Examination

The student will have identified a topic and submit the title and abstract to their dissertation committee. The topic can be related or unrelated to the student's 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; background and significance; preliminary data; research plan and references. Margins and font size are detailed on the NIH website. A minimum of 18 single spaced pages and a maximum of 25, 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 each committee member two weeks prior to the oral examination. The student is expected to display scientific proficiency.

The faculty strongly emphasizes that the responsibility for the quality of the proposal, be it originality, approach, or significance, rests completely with the student. The student selects the area, prepares the written proposal, submits it to his/her advisory committee, and defends it at the oral. 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.

6.17 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.

6.18 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 \$15) 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 Graduate Student Academic Services (GSAS). 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 through GradPath and can be accessed from: <https://uaccess.arizona.edu/>

6.19 DISSERTATION

This begins when the student picks a laboratory and advisor. Planning the research program begins in meetings with the Major Research 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** (<https://grad.arizona.edu/gsas/dissertations-theses/dissertation-and-thesis-formatting-guides>). 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 no later than **seven (7) working days before the examination date**.

6.20 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 open to the public. 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.

6.21 LIMITATION ON TIME SPANS

The Ph.D. degree with a major in Pharmaceutics 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. If more time is needed, students may retake their comprehensive exams with departmental approval.

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.

6.22 TIMETABLE, FORMAL DOCUMENTATION, AND DEADLINE DATES

The following forms and deadlines are required by the College of Pharmacy Graduate Programs Office and Graduate Degree Certification. 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 (1st month in residence)
- b. Code of Academic Integrity (1st month in residence)
- c. Doctoral Plan of Study (3rd semester in residence)
- d. Oral Comprehensive Examination Committee Form (3rd 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 Pharmaceutics 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 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 1st 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).