

School of Pharmacy

UMKC 2007-08 Undergraduate Catalog (1.0)

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Contents

School of Pharmacy	5
General Information	5
Degrees Offered	5
Doctor of Pharmacy	5
First Professional Programs	5
Admissions	6
Student Learning Outcomes	6
Doctor of Pharmacy Curricular Requirements	8
Career Applications	10
Bachelor of Science in Pharmaceutical Science	10
School Activities	12
Libraries	12
Student Services	12
Student Life	12
Student Organizations	12
Scholarships, Special Awards and Financial Assistance	13
Academic Regulations and Requirements	17
State Licensure Requirements	20
Continuing Education Programs	20
Pharmacy (PHARM) Courses	20

School of Pharmacy

Health Sciences Building
Hospital Hill Campus
2464 Charlotte Street
(816) 235-1609
Fax: (816) 235-5190
(816) 235-1613 (Student Services)
Fax: (816) 235-5562 (Student Services)
pharmacy@umkc.edu
<http://pharmacy.umkc.edu>

Mailing Address

University of Missouri-Kansas City
School of Pharmacy
2464 Charlotte Street
Kansas City, MO 64108

Dean:

Robert W. Piepho

Associate Dean:

Wayne M. Brown

Assistant Deans:

Mary L. Euler

Kathleen A. Snella

General Information

History

Originally organized in 1885 as the Pharmaceutical Department of the University of Kansas City, the school was reorganized and reincorporated in 1898 as the Kansas City College of Pharmacy and Natural Science. In 1943, this forerunner of the present school joined the University of Kansas City as its third professional school.

When the University of Kansas City was incorporated into the University of Missouri System in 1963, the School of Pharmacy became the only state-supported pharmacy school in Missouri. In October 1985, the school observed its centennial celebration, commemorating 100 years of progress in pharmaceutical education, research and service.

The School of Pharmacy is a member of the American Association of Colleges of Pharmacy (AACP). The doctor of pharmacy program is accredited by the Accreditation Council for Pharmacy Education (ACPE). The most recent accreditation review was in 2003, when full accreditation was continued. The next on-site accreditation review will be during the 2009-10 academic year. Anyone interested can contact ACPE at <http://www.acpe-accredit.org> for more information. The bachelor of science and master of science degrees are accredited by North Central Association of Schools and Colleges.

Degrees Offered

The School of Pharmacy offers programs leading to the advanced professional degree of doctor of pharmacy and the undergraduate-level bachelor's of science in pharmaceutical science. The master of science in pharmaceutical science is the graduate-level degree. Emphasis areas available in the master's degree program are pharmaceuticals (including pharmaceutical technology and pharmacokinetics), pharmaceutical chemistry (including medicinal chemistry), pharmacology and toxicology. The School of Pharmacy participates in the Interdisciplinary Ph.D. program through the school of graduate studies with emphasis areas in pharmaceutical science and pharmacology.

The UMKC School of Pharmacy offers a Pharm.D. satellite program on the University of Missouri-Columbia (UMC) campus in conjunction with the School of Health Professions. The traditional (UMKC campus) and satellite

Pharm.D. programs encompass five years of professional study after completion of the required pre-pharmacy coursework. Although students enrolled in the satellite program will be on the UMC campus, these students will be considered UMKC students. Students accepted into the satellite Pharm.D. program will complete the basic science and general education courses in traditional classroom settings on the Columbia campus whereas students accepted to the traditional program will complete coursework on the UMKC campus. Pharmacy specific courses offered on the UMKC campus will be transmitted via distance education technology from UMKC to students enrolled in the satellite program.

Doctor of Pharmacy (Pharm.D.)

First Professional Program

A pharmacist is a medication expert whose obligation is to deliver pharmaceutical care. Pharmaceutical care is "the responsible provision of drug therapy for the purpose of achieving a definite outcome that improves a patient's quality of life" (Hepler and Strand). A pharmacist's functions include but are not limited to:

- Identifying, preventing and/or resolving drug-related problems.
- Preventing disease and promoting good health practices through rational drug therapy.
- Providing drug information to the public.
- Educating other health care professionals about appropriate drug therapies.
- Collaborating with other health care professionals to improve health outcomes, especially as they relate to the appropriate use of medications.
- Ensuring that medications are delivered to the patient in a safe manner.

Many practice areas are covered by these responsibilities. The curriculum is designed to develop the competencies of graduates, allowing them to assume the responsibilities listed above.

Preparing for a Pharmacy Education

To help prepare themselves for a pharmacy education, high school students should plan a course of study that includes a mathematics and science emphasis. Pre-pharmacy advisers are available on the campuses of most Missouri institutions of higher education. College students planning to apply for admission to the School of Pharmacy should consult these special advisers for assistance in planning their pre-pharmacy coursework. Students taking their pre-professional coursework at UMKC should contact the School of Pharmacy Student Services Office for advising on pre-pharmacy courses.

Program for Top High School Seniors

High school seniors who graduate in the upper 10 percent academic ranking of their class, whose ACT composite score is a minimum of 23, or whose ACT composite score is a 28 or higher, irrespective of class rank, are eligible to apply for the Freshman Provisional Admission Program. As many as 30 provisional freshmen are accepted each year. Provisional students complete the pre-pharmacy coursework at UMKC and take the Pharmacy College Admissions Test during their freshman year. Students accepted into the provisional admission program hold a reserve seat in the first professional year of the Pharm.D. program if they successfully complete freshman year eligibility requirements. Students meeting high school eligibility requirements should contact the Pharmacy Student Services office about this option early in the student's senior year for more information, and to request a special application packet. The application deadline is Jan. 15.

Pre-Pharmacy Requirements for College Transfer Students

A minimum of 31 credit hours of college work, including the specified pre-professional requirements listed below, must be completed prior to admission to the professional pharmacy program of study with a grade of C or better. In addition, an overall cumulative grade-point average of 2.75 (on a 4.0 scale) and a science/math grade-point average of 2.5 (on a 4.0 scale) must be achieved on all college-level work completed through the end of the fall term preceding the year of entry to meet minimum eligibility requirements. Pre-pharmacy courses may be completed at any accredited higher education institution or in the College of Arts and Sciences at UMKC.

Pre-Pharmacy Curriculum/Semester Hours

English Composition*	6
Calculus with Analytical Geometry**	4
General Chemistry I & II with Lab	8
General Biology I & II#	6
Physics with Lab	4
Electives in Humanities and Social Sciences*	3-6
Minimum Required Hours	31

*Students attending institutions restricting freshman admission to the English Composition II course may substitute three additional hours of electives in the social sciences or humanities. A second semester of English composition may be completed on admission to the School of Pharmacy. All pharmacy students must successfully complete six hours of English composition and pass the Written English Proficiency Test and one of the two writing intensive courses prior to enrollment in Pharmacy 7414.

**Calculus courses that are less than 4.0 credit hours or that do not include analytical geometry will not meet the minimum requirement.

#Preparatory or introductory biology courses will not meet the minimum requirement.

Pre-pharmacy coursework must total a minimum of 31 credit hours. General CLEP credits may not be used to fulfill the mathematics, physics, or chemistry requirements.

Doctor of Pharmacy Admissions

The doctor of pharmacy (Pharm.D.) degree provides minimum and advanced level competencies necessary for the graduate to assume a pharmacist's professional responsibilities and qualify for the licensure examinations. The program of study emphasizes clinical sciences and training experiences. The training of doctor of pharmacy students concentrates on rational drug therapy decision-making within the interprofessional health care team.

Application Procedures

Applications for the doctor of pharmacy program are accepted between Sept. 1 and Jan. 15 of each year for consideration for admission to the class entering the following fall. Admission to the School of Pharmacy is competitive. Applicants who meet the minimum requirements for admission may not be accepted due to space availability restrictions. New students are admitted to the doctor of pharmacy program only in the fall of each year. Complete UMKC Doctor of Pharmacy applications must be postmarked no later than Jan. 15 in order to be considered. For application forms and information about degree programs and requirements, prospective students can visit <http://pharmacy.umkc.edu> or contact:

UMKC School of Pharmacy
Student Services Office
2464 Charlotte Street
Kansas City, MO 64108
(816) 235-1613
Fax: (816) 235-5562
pharmacy@umkc.edu

All of the steps listed below must be adhered to carefully and all required documents must be postmarked by or submitted to the UMKC Pharmacy Student Services Office no later than the Jan. 15 deadline, unless otherwise stated.

1. You must submit a completed UMKC Doctor of Pharmacy application for admission including the application fee (\$35 for U.S. residents and \$50 for international applicants). Note: students who are currently or have attended UMKC previously are not required to submit the application fee.
2. Official transcripts of all previous college coursework must be received by the School of Pharmacy Student Services Office. Applicants must have achieved a minimum 2.75 cumulative grade-point average (on a 4.0 scale) and a 2.5 science/math grade-point average (on a 4.0 scale) on all college-level work completed through the end of the fall term preceding the year of entry to meet minimum eligibility requirements.
3. The Pharmacy College Admission Test (PCAT) must be taken and scores forwarded to the School of Pharmacy from the official testing agency no later than March 1.
4. One official recommendation form must be completed from the application packet.
5. Students whose native language is not English must follow the UMKC English Proficiency Requirements for International Students. The minimum TOEFL score required is 220 computer score or 560 paper version.
6. Eligible applicants must complete a structured interview at the School of Pharmacy scheduled on a Saturday in March or April. Applicants are notified by e-mail before their scheduled interview. Note: meeting minimum eligibility requirements does not automatically qualify an applicant for an interview. Based on the academic and application credentials of the applicant pool, the school will select candidates for an interview. Students who do not qualify will also receive written notice.

Notification of Acceptance

Students will receive written notification of the school's decision concerning their applications on or prior to May 1 unless otherwise indicated.

Official supplementary college transcripts must be submitted to the Pharmacy Student Services Office upon completion of spring and summer coursework. Acceptance is contingent on submission of a criminal background check and satisfactory completion (grade of C or higher) of the specified minimum hours of pre-professional collegiate coursework. Those students approved for admission will be required to confirm their acceptance and submit an advance deposit of \$100 to guarantee their places in the entering class. This deposit is applied to the first term's educational fee and is not refundable.

Student Learning Outcomes**Curricular Outcomes Expected of Pharmacy Graduates**

Pharm.D. graduate outcomes include competence in Domains I-IV. Baccalaureate pharmacy graduate outcomes include competence in Domain I, Competency IB, Components 1, 4, 5 and 7 and Domain IV.

Domain I. Provide Pharmaceutical Care

Competency IA: Gathers and organizes information in order to identify ongoing or potential health-related problems and the root cause of the problems. Components:

- Understands and collects accurate and comprehensive information from appropriate sources.
- Identifies the patients primary complaint(s) and reason(s) for seeking medical care.

- Employs clinical assessment skills to determine the adequacy of patient therapeutic self-management.
- Organizes patient information to facilitate the pharmaceutical care process.

Competency IB: Interprets and evaluates pharmaceutical data and related information needed to prevent or resolve health-related problems or to respond to information requests.

Components:

- Understands basic principles of pharmacology, including mechanisms and theories in Pharmacokinetics and Bio-pharmaceutics, classification, mechanisms of drug actions, therapeutic uses, contraindications and toxic effects of the major classes or prescribed drugs, over-the-counter drugs and common dietary supplements.
- Identifies medication-related problems.
- Applies evidence-based medicine principles including study design, research methods and biostatistical interpretation to evaluate pertinent research studies.
- Assesses physical properties and chemical data.
- Evaluates laboratory test results and Pharmacokinetics and Bio-pharmaceutics data.
- Evaluates information obtained from the patients history and physical assessment that will affect drug selection, dose and schedule to reach therapeutics outcomes.
- Makes reasonable assumptions and/or draw reasonable conclusions when data are incomplete.

Competency IC: Formulates a pharmaceutical care plan in collaboration with other health care professionals, patients and/or their caregivers. Components:

- Communicates pertinent information from the patients medical record.
- Develops evidence-based conclusions and recommendations.
- Recommends appropriate health-related treatments.
- Recommends appropriate medication dose, schedule and delivery system based upon relevant patient factors, such as pharmacodynamic, physiologic, pharmacokinetic and socioeconomic parameters.
- Makes referrals to other health care agencies or professionals where indicated.

Competency ID: Implements the pharmaceutical care plan in compliance with state and federal law. Components:

- Accurately prepares and/or compounds prescriptions and orders, and provides an appropriate container for the drug product.
- Demonstrates effective oral and written communication tailored to the individual needs of the audience and type of setting.
- Knowledgeable of State and Federal laws governing the practice of pharmacy.

Competency IE: Performs ongoing patient evaluation.

Components:

- Monitors, assesses and optimizes the safety and efficacy of therapeutic plans.
- Identifies additional health-related problems.

Competency IF: Documents pharmaceutical care activities.

Domain II: Medication Use Management

Competency IIA: Participates in population-based medication use management process using evidence-based principles.

Components:

- Identifies, reports and manages medication errors and adverse drug reactions.

- Participates in the pharmaceutical care systems process for conducting drug evaluations.
- Participates in the development, implementation, evaluation and modification of a formulary system.
- Understand principles of health services research (outcome and quality assessment methods) to the evaluation of pharmaceutical care.

Domain III: Health Care

Competency IIIA: Understand factors influencing the provision of high quality pharmaceutical care. Components:

- Complies with Federal, State and Local laws and related regulations.
- Understands the influence of policy recommendations on professional practice.
- Understands the influence of alternative payment systems on care.
- Understands the influence of operational issues in the provision of care.

Competency IIIB: Contributes to the improvement of community health. Components:

- Demonstrate knowledge of community health issues.
- Understand the role of pharmacy in improving community health.
 - Ability to promote community awareness of health and disease.
 - Ability to serve as a catalyst for the utilization of community health resources to improve health.
- Ability to advocate the profession as a catalyst for the improvement of community health.

Domain IV: Behavioral-Based Abilities. Displays habits, attitudes and values consistent with pharmaceutical care.

Competency IVA: Thinking. Components:

- Identifies, retrieves, understands, analyzes, synthesizes and applies information needed to make informed, rational and ethical decisions.
- Solves problems that require an integration of ones ideas and values within a context of scientific, social, cultural, legal, clinical and ethical decisions.

Competency IVB: Communication. Effective communication is clear, accurate, confident and appropriate to the situation.

Components:

- Listens effectively.
- Uses spoken language effectively.
- Uses written language effectively.

Competency IVC: Ethical Decision Making. Components:

- Recognizes ethical dilemmas in all areas of professional life.
- Makes and defends rational decisions regarding professional situations within a context of personal values and professional ethics.

Competency IVD: Social and Contextual Awareness.

Components:

- Demonstrates an awareness of and value for diversity.
- Demonstrates competency within cross cultural interactions and settings.
- Evaluates different types of interpersonal behaviors and their roles in effective social interactions.

Competency IVE: Social Responsibility. Components:

- Participates in professional growth opportunities through volunteer activities in the community.

- Demonstrates an appreciation of the obligation to participate in efforts to help individuals and to improve society and the health care system.
- Advocates improved professional approaches to meet the pharmacy-related needs of society and individual patients.

Competency IVF: Self-Learning Abilities. Component:

- Self-assess learning needs and design, implement and evaluate strategies to promote intellectual growth and development.
- Deliver and receive constructive critique regarding professional performance.

Doctor of Pharmacy Curricular Requirements

The doctor of pharmacy degree program provides broad and general preparation in professional areas of practice with the intent that, on completion, graduates will be able to practice at a level sufficient to perform the established functions of a pharmacist. In addition, the Pharm.D. program prepares the student for advanced levels of professional practice. The major emphasis is on the clinical sciences and drug-related patient care.

This program is designed to provide advanced education and training in clinical pharmacy and drug information with particular emphasis on interprofessional team participation in the delivery of health care. To enable students to concentrate solely on this advanced professional coursework, those entering the doctor of pharmacy program are strongly encouraged to limit their work and/or intern hours during the academic year.

The five year professional course of study leading to the doctor of pharmacy encompasses 10 semesters. Coursework in the first professional year includes various required science courses and additional humanities and social science electives, as well as introductory-level pharmacy courses.

In semesters three and four, students complete their basic science foundation courses, lecture and lab courses in the pharmaceutical sciences, begin the service learning component and continue the professional development series.

In semesters five and six, students engage in advanced lecture and laboratory coursework in the pharmaceutical and pharmacological sciences, introductory clinical sciences, finish the professional development series and select professional electives designed to reinforce the pharmacy career track.

In semesters seven and eight, Pharm.D. candidates pursue advanced coursework in the clinical sciences to include pharmacotherapeutics, evidence based medicine and health assessment, and attend clinical practice rotations. During this period, students also finish professional electives.

The final two semesters encompass advanced clinical clerkship rotations. Drug literature evaluation, instruction and practice will be an integral part of the clinical clerkship experience. Each student will be exposed to a core number of required and elective clinical clerkship experiences.

During clerkships the Pharm.D. student is expected to assume the clinical responsibility of a pharmacist under the direct supervision of a faculty member. The emphasis of the candidate's activities will be the management of pharmacotherapeutic and pharmacokinetic problems encountered with patients' drug regimens at the assigned practice site. Candidates also will be engaged in ongoing drug utilization reviews, patient and health provider education programs, and other pertinent activities involved in the provision of patient care.

While clinical responsibilities occur during all of the candidate's experiential rotations, the primary focus will vary with a student's choice of elective clerkship experiences. Health systems rotations will focus on the organizational,

technical and administrative aspects of providing pharmaceutical care.

Candidates are required to complete approximately eight months of experiential rotations. Experiential clerkship rotation prerequisites include satisfactory completion of all degree requirements prior to semester nine of the professional curriculum. Candidates also must be certified as a basic cardiac life support (BCLS) and First Aid provider, show proof of a current Missouri Intern license, coverage for pharmacy liability insurance and a criminal background check. All immunizations, as listed in this section of the catalog, must be on file with the Office of Experiential Programs before academic service learning and clinical practice rotations begin and must remain current through the last rotation. Students on experiential rotations may not enroll in didactic courses outside of the required Pharm.D. curriculum without prior approval of the Director of Experiential Learning.

Doctor of pharmacy students are strongly encouraged to attend the American Society of Health-Systems Pharmacists Mid-Year Clinical Meeting in December to begin residency interviews.

Because pharmacy is a profession undergoing rapid change, the curriculum is subject to continual review and modification. As society's needs for specific types of pharmaceutical service change, the curriculum will change as well. To assure the best pharmaceutical education for its students, the School of Pharmacy reserves the right of making judicious changes and improvements in course sequence and content at any time.

Pharm.D. Graduation Requirements

To graduate, Pharm.D. candidates must meet the following requirements in addition to the 31 credit hour prerequisite requirements:

Semester One		Hours
PHARM 7101	Professional Skills Development I	2
PHARM 7125	Medical Terminology	1
PHARM 7151	Introduction to Pharmacy Law	1
LSANAT 119	Human Anatomy	3
LSANAT 119L	Human Anatomy Lab	1
CHEM 321	Organic Chemistry I	3
CHEM 321L	Organic Chemistry I Lab	1
BIOL 202	Cell Biology	3
COMS 110	Fund. of Eff. Speaking and Listening	3
Total		18
Semester Two		Hours
PHARM 7110	Pharmacy Calculations	2
PHARM 7266	Medical and Medication Error Evaluation and Management	3
CHEM 322R	Organic Chemistry II	3
CHEM 322L	Organic Chemistry II Lab	1
LSMCRB 121	Microbiology	4
Course covering the U.S. Constitution		3
HIST 101	American History to 1877,	
HIST 102	American History Since 1877 or	
POLSC 210	American Government	
Total		16
Semester Three		Hours
PHARM 7202	Pharmaceutics I	4
PHARM 7341	Medicinal Chemistry I	3
LSBIOC 365	Human Biochemistry I	3
LSPHYS 399	Pharmacy Physiology I	3
Total		13
Semester Four		Hours
PHARM 7203	Pharmaceutics II	3
PHARM 7344	Medicinal Chemistry II	3
PHARM 7414	Professional Skills Development II	3
LSBIOC 366	Human Biochemistry II	3
LSPHYS 400	Pharmacy Physiology II	3
Total		15

Semester Five		Hours
PHARM 7245	Top 200 Drugs I(a)	.5
PHARM 7310	Academic Service Learning(b)	1
NURSE 5548	Advanced Pathophysiology	3
PHARM 7361	Pharmacology I	4
PHARM 7325	Business, Professional and Technical Writing for Pharmacy Students	2
PHARM 7465	Economics of Health and Medicine	3
PHARM 7104	Professional Skills Development III	2
Total		(a)15.5
Semester Six		Hours
PHARM 7245	Top 200 Drugs I(a)	.5
PHARM 7310	Academic Service Learning(b)	1
PHARM 7303	Pharmacokinetics & Biopharmaceutics	4
	Professional Elective(c)	3
PHARM 7362	Pharmacology II	5
PHARM 7405	Pharmacotherapy I	3
PHARM 7463	Toxicology	2
Total		(a)18.5

(a) Pharmacy 7245 must be successfully completed during either the fall or spring semester.

(b) Pharmacy 7310 must be successfully completed in either the fall or spring semester (1/2 of the class each semester). The following requirements must be met and documentation on file in the Office of Experiential Rotations before enrollment in the Academic Service Learning (ASL) courses and must remain current through the student last clinical clerkship rotation.

- Proof of immunizations
 - Hepatitis B series
 - Two MMRs
 - Chicken pox
 - Tuberculin skin test results
- Basic Cardiac Life Support (BCLS) certification
- First Aid certification
- Proof of pharmacy liability insurance
- Missouri pharmacy intern license

A criminal background check may be required for some ASL sites.

Semester Seven		Hours
PHARM 7389	Advances in Drug Therapy	2
PHARM 7345	Top 200 Drugs II(d)	.5
PHARM 7406P	General Medicine I(e)	4
PHARM 7420	Health Assessment & Pharmacotherapy II	7
PHARM 7451	Pharmacy Law & Ethics	2
	Professional Elective(s)(c)	4
Total		(d)19.5

Semester Eight		Hours
PHARM 7326	Evidence Based Medicine	5
PHARM 7345	Top 200 Drugs II(d)	.5
PHARM 7485P	Health Assessment & Pharmacotherapy III	7
	Professional Elective(c)	3
Total		(d)15.5

(c) A minimum of 10 credit hours of professional elective coursework must be completed while enrolled in the School of Pharmacy. No more than five credit hours of the 10 hours can come from courses outside the School of Pharmacy. Coursework completed before entry in the professional program will not transfer as professional elective credit. General and professional elective courses cannot be double counted. Courses count as either general electives or professional electives.

The following is a partial list of courses approved to satisfy professional electives:

- Home Health Care
- Principles of Nutritional Support
- Reproductive Biology
- Computers in Pharmacy
- Radiopharmaceuticals
- Hospital Pharmacy
- Islam and Modern Practice of Medicine and Pharmacy
- Social and Psychological Development Through the Life Cycle
- The Experience of Health in Aging
- Death and Dying
- Policies of Drug Use and Control
- Pharmacy Seminar
- Directed Individual Study
- Health Service Administration and the Health Professions
- Introduction Therapeutics with Dietary Supplements

A current list of approved professional electives may be obtained from the Pharmacy Student Services Office or through the School of Pharmacy Web site.

(d) Pharmacy 7345 must be successfully completed during either the fall or spring semester.

(e) Students enroll in General Medicine I during the fall semester for 4.0 credit hours, however, half of the General Medicine I course is completed during the fall and the remainder of the course during the spring semester. Spring re-enrollment is not required.

Semester Nine
Pharmacy Clerkships Hours vary

Semester Ten
Pharmacy Clerkships Hours vary

Required Clerkships

PHARM 7404P	Drug Information Clerkship
PHARM 7406P	General Medicine I
PHARM 7407P	General Medicine II
PHARM 7409P	Health Systems Clerkship
PHARM 7410P	General Medicine III
PHARM 7412P	Community Pharmacy Practice Clerkship
PHARM 7418P	Elective Clerkship I
PHARM 7419P	General Medicine IV

Optional Clerkships

PHARM 7420P	Elective Clerkship II
PHARM 7421P	Elective Clerkship III

The following requirements must be met and documentation on file in the Office of Experiential Rotations before enrollment in clinical experiential rotation courses and must remain current through the student last rotation.

- Proof of immunizations
 - Hepatitis B series
 - Two MMRs
 - Chicken pox
 - Tuberculin skin test results (annual requirement)
- Basic Cardiac Life Support (BCLS) certification
- First Aid certification
- Proof of pharmacy liability insurance
- Missouri pharmacy intern license
- Criminal background check

Graduation Requirements

To graduate, students must successfully complete all required coursework listed in the curriculum for a minimum of 184 hours (including the 31-hour pre-professional coursework

requirement) and all non-credit requirements in effect at the time of completion. Prior to graduation, students also must demonstrate proficiency in English. Within the 184 hours, the following minimums must be met:

Mathematics/Basic Science coursework	53 hours
Humanities & Social Science coursework	12 hours
Pharmacy Didactic coursework	74 hours
Professional Electives	10 hours
Experiential Learning	31 hours

Humanities and social science course requirements (including pre-pharmacy coursework):

English Composition	6 hours
Fundamentals of Effective Speaking & Listening	3 hours
U.S. Constitution course	3 hours

Students with a previous baccalaureate degree from a regionally accredited institution in the United States are exempt from the Written English Proficiency Test and the writing intensive requirement.

Pharmacy Careers

A number of graduates choose to practice in community and hospital pharmacies, but a wide variety of career possibilities in the pharmacy profession are available. Pharmacists have a wide spectrum of practice environments to choose from in which their professional skills can be applied. The salary range will vary with the location and type of practice. However, the annual starting salary in the Midwest for a pharmacist ranges from \$70,000 to \$90,000.

The community environment, including both private and corporate-owned pharmacies, offers the pharmacist the opportunity to practice, or to assume management positions. Organized health care institutions (hospitals, nursing homes and managed health care facilities) also offer the practitioner exciting practice opportunities.

Many nontraditional services are provided by pharmacists in the community including home nutrition, nuclear pharmacy, nursing home consultation and long-term care.

Graduates may choose to enter careers in the pharmaceutical industry in product development and control, marketing and manufacturing, management, sales and public relations and advertising. Career opportunities for pharmacists are available in state and federal government service in staff and supervisory positions in the U.S. Public Health Service, Department of Veterans Affairs, Food and Drug Administration, Bureau of Narcotics and Dangerous Drugs, in-state health agencies and in all branches of the armed services.

The doctor of pharmacy program also provides an appropriate academic base for students wishing to enter graduate study in the pharmaceutical sciences, chemistry and biology. Others have gone on to pursue degrees in medicine, dentistry and law.

Postgraduate training in the form of a residency and optional fellowship is recommended for all doctor of pharmacy graduates seeking advanced career opportunities in industry or academia.

Bachelor of Science in Pharmaceutical Science (B.S.)

The four-year bachelor of science in pharmaceutical science degree program is an undergraduate degree that does not prepare graduates for pharmacist licensure. Interest in developing a four-year baccalaureate degree program in pharmaceutical science was generated by the desire of the faculty to expand the educational base of the school in the health-related sciences and the projection that graduates of the bachelor of sciences in pharmaceutical science program will

help meet current and future societal needs in these fields of study.

Definition and General Description of the Program

Schools of pharmacy, as well as schools of medicine, have traditionally focused on the medically related life sciences. While schools of medicine generally have not become involved in undergraduate education, schools of pharmacy have evolved professional programs producing pharmacists and pharmaceutical scientists in direct collaboration with colleges of arts and sciences. Pharmaceutical science represents, in one sense, the collective basic science that underlies pharmacy. Rooted in discovery and development of therapeutics, pharmaceutical scientists seek to identify and understand chemical, biochemical, pharmacological, toxicological and other fundamental processes necessary to define and sustain the desired therapeutic effect. Pharmaceutical science and pharmacy itself both clearly require early training in biology, chemistry and physics. While students in these more basic disciplines move on to increasingly specialized courses of study indigenous to those separate sciences, students of pharmaceutical sciences, or related life sciences, evolve in a course of study which continues to stress a cross-fertilization of ideas of fundamental biology and chemistry while focusing on the complexity and balance of living systems.

Students in the pharmaceutical science degree program will be broadly trained during the early stages of the curriculum in the arts, humanities and social sciences while achieving a broad early emphasis in the natural sciences and a later specialization within the chemical and pharmaceutical sciences. The program of study will sharpen their cognitive and affective skills consistent with other alternative programs at the UMKC campus. The structure, diversity and functional characterization of living systems will be studied, examined, and understood with emphasis on the nature of disease, the disease process, and the design and development of drugs and dosage forms.

Career Applications

Students in the B.S. in pharmaceutical science program will be prepared to begin specialized study at the graduate level in a number of pharmaceutical sciences. They may directly enter the work force in the biomedical or pharmaceutical industry and make a significant contribution to the health and well-being of society through the design and development of novel therapeutic agents or processes. More importantly, their understanding of the interactions between environmental chemicals and humans will make them attractive applicants for positions in regulatory agencies and industries dealing with such issues. The advanced graduate and postgraduate education which some will seek will result in a higher level of scholarship and the potential for a more fundamental contribution.

The specific demand for students trained at the B.S. level in pharmaceutical science is increasing. In the pharmaceutical industry, graduates with this specific training have been sought as technical assistants in pharmacological and pharmaceutical laboratories and related areas where the B.S. trained biologist or chemist would not be expected to be as attractive a candidate.

It is widely acknowledged that schools and colleges of pharmacy need to increase the number of B.S.-trained pharmaceutical scientists who will enter their graduate programs. The graduates of Ph.D. programs in pharmaceutical science are in increasing demand in both academia and the pharmaceutical industry, and are expected to provide the primary base from which the professorate of colleges and schools of pharmacy is renewed and continued. Graduates with

a B.S. in pharmaceutical science also can apply for sales positions in the pharmaceutical industry.

Advising

Students will receive academic advising from professional staff in the Pharmacy Student Services Office, as well as a faculty adviser. Applicants may elect to complete the first two years of the B.S. in pharmaceutical science curriculum at another accredited college or university and then transfer to UMKC. Students planning to transfer coursework should check with the Pharmacy Student Services Office to verify course transfer equivalencies from other institutions.

Application

Admission to the program requires a student to complete the UMKC general application. Completion of supplemental materials currently are not required. Applicants must have achieved a minimum 2.5 cumulative college grade-point average to meet eligibility requirements for admission. Contact the Pharmacy Student Services Office at (816) 235-1613 or send an e-mail to pharmacy@umkc.edu if you have questions regarding the degree program.

Because pharmacy is a profession undergoing rapid change, the curriculum is subject to continual review and modification. As society's needs for specific types of pharmaceutical service change, the curriculum will change as well. To assure the best pharmaceutical education for its students, the School of Pharmacy reserves the right of making judicious changes and improvements in course sequence and content at any time.

Description of the Curriculum

		Hours
Semester One		
ENGL 110	English Composition I	3
BIOL 108/108L	General Biology I	4
CHEM 211/211L	General Chemistry I	5
	General Elective (Speech)	3
Total		15
Semester Two		
ENGL 225	English Composition II	3
BIOL 109/109L	General Biology II	4
CHEM 212R/212LR	General Chemistry II	5
	General Electives	6
Total		18
Semester Three		
MATH 210	Calculus w/Analytical Geometry	4
CHEM 321/321L	Organic Chemistry I	4
BIOL 202	Cell Biology	3
	General Elective (U.S. Constitution)	3
	General Elective	3
Total		17
Semester Four		
PHARM 7110	Pharmaceutical Calculations	2
CHEM 322R/322L	Organic Chemistry II	4
PHYS 210	Physics w/Lab	4
	Statistics*	3
	General Elective	3
Total		16
* The statistics course can be satisfied by successful completion of EDUC 505 or MATH 235.		
Semester Five		
PHARM 7341	Medicinal Chemistry I	3
LSBIOC 365	Human Biochemistry I	3
LSPHYS 399	Pharmacy Physiology I	3
	General Electives	6
Total		15

		Hours
Semester Six		
PHARM 7344	Medicinal Chemistry II	3
CHEM 341	Analytical Chemistry I	4
LSBIOC 366	Human Biochemistry II	3
LSPHYS 400	Pharmacy Physiology II	3
	General Elective (writing intensive)**	3
Total		16

** Students must pass the Written English Proficiency Test (WEPT) prior to enrollment in the writing intensive elective.

General CLEP credits may not be used to fulfill the mathematics, physics, or chemistry requirements.

		Hours
Semester Seven		
PHARM 7202	Pharmaceutics I	4
PHARM 7361	Pharmacology I	4
	Pharmacy Capstone Course	2
CHEM 345R	Instrumental Analysis	3
	400/5500 level Science Elective***	3
Total		16

		Hours
Semester Eight		
PHARM 7203	Pharmaceutics II	4
PHARM 7303	Pharmacokinetics & Biopharmaceutics	4
PHARM 7362	Pharmacology II	5
PHARM 7463	Toxicology	2
	Pharmacy Capstone Course	2
Total		17

*** This optional elective brings the credit hours to 129. This elective is not necessary to achieve the minimum credit hours for a UMKC baccalaureate degree, but it allows the student to select a 400- or 5500-level course in chemistry or biology or a 7400- or 5500-level course in pharmacy.

Students must complete the following general education requirements:

- ENGL 110 English Composition I
- ENGL 225 English Composition II
- 3 credit hours of fine arts from:
 - Art
 - Art History
 - Music
 - Theatre
- 3 credit hours of humanities course work from:
 - Foreign Language
 - Philosophy
 - English
 - Communication Studies
- 6 credit hours of social and behavioral sciences from:
 - Sociology
 - Geography
 - Criminal Justice
 - Psychology
 - Economics
- One course covering the U.S. Constitution from:
 - American History
 - American Government
- One public speaking course
- 6 credit hours of higher order thinking courses from:
 - Western Civilization
 - Ancient History
 - Philosophy
 - Logic
 - Cultural Anthropology
- One 3 credit hour writing intensive course.

Students are encouraged to work with their faculty adviser in planning their capstone course work. Students may choose to complete dual and/or double B.S. degrees in a related area. Students are also encouraged to seek out internship

opportunities. Internship opportunities are usually a paid experience where a student can gain valuable, hands-on knowledge related to their program of study (Note: students may not obtain course credit through internships).

School Activities

Advising System

On entry into the pharmacy program, each student is assigned a professional development adviser (PDA). The PDA acts as a mentor during the program.

It is particularly important that students regularly meet with their PDA to ensure that they are meeting all requirements.

The PDA's role is to counsel and advise students, based on each student's individual needs. If students are experiencing difficulties, whether academic, financial or personal, or if they would like more in-depth information about various facets of the curriculum or career alternatives, they should seek counsel from the PDA. The advisers are familiar with the various sources of assistance and will help students seek the best solution to their problems. Building a strong relationship with the PDA is strongly encouraged.

Libraries

The University Libraries provide the full spectrum of information services to support study and research in pharmacy. For additional information, consult the University Libraries section of this catalog.

Student Services

The School of Pharmacy offers a variety of services to assist students in support of academic experience. Student services, which are available not only through the School of Pharmacy, but throughout the University, are outlined in the Division of Student Affairs section of this catalog.

Student Life

Student Government

The student body annually elects an Executive Pharmacy Student Council, which consists of the president, president-elect, executive vice president, vice president for professional projects, secretary and treasurer of the student chapter of the American Pharmacists Association, the Academy of Students of Pharmacy (ASP), two All Student Association representatives and two representatives from each professional class. This group supervises the annual student activities budget process and recommends students to represent the student body on various campus committees. The Pharmacy Student Council Executive Committee, class officers and representatives from each of the student organizations recognized by the School of Pharmacy faculty meet on a regular basis to share concerns and to exchange information about each group's activities.

The Student ASP Script

A student-administered, student-oriented newsletter is published twice each semester by the Academy of Students of Pharmacy (ASP) at UMKC. Its purpose is to inform the student body, as well as the faculty and staff of student activities and achievements, announce available opportunities and report on developments affecting student life. It is a primary vehicle of communication within the school. Articles are welcomed from any student, student organization, faculty or staff member.

Student Organizations

Academy of Managed Care Pharmacy (AMCP)

AMCP is the national professional society dedicated to the concept and practice of pharmaceutical care in managed health care environments. Its mission is to promote the development

and application of pharmaceutical care in order to ensure appropriate health care outcomes for all individuals. Its sole purpose is to represent the views and interests of managed care pharmacy. The UMKC Chapter of AMCP members participate in programs such as Kansas City Antibiotic Taskforce (KART). The KART program teaches elementary school children about germ transfer and the importance of washing hands. Members also participate in pharmacy and therapeutics competitions at the national level. Membership in the organization helps to expose student pharmacists to the practice of managed care pharmacy.

Academy of Students of Pharmacy (ASP)

This professional organization is the student branch of the American Pharmacists Association (APhA). ASP provides a means for pharmacy students to become involved at the state, regional and national levels in the pharmacy profession. Members annually send delegations to the regional and national meetings of the association. The UMKC ASP chapter has been recognized numerous times at regional and national levels for its many professional and service activities.

The local chapter acts as the student governing body for the School of Pharmacy and represents the pharmacy students in the campus Student Government Association. Membership is encouraged of all Pharm.D. students. Pre-pharmacy students also are eligible to join. Membership in ASP also includes subscriptions to several professional publications such as the Journal of the American Pharmacists Association, Pharmacists.com and the Missouri Pharmacist. In addition, membership entitles a student to discounts on books, malpractice insurance and car insurance.

Community Service is a major part of professional career development and outreach. Through nationally sponsored projects like Operation Diabetes and Operation Immunization, students have a direct impact on the health of their community while promoting the role of the pharmacist. UMKCs own sponsored Project Outreach allows students to reach out into the elementary schools and encourage positive life decisions.

ASP is not all work, though. Its members reach across the borders and plan social events with neighboring schools of pharmacy to promote lasting relationships.

Now, more than ever, students have the opportunity to let your voice be heard and involvement in organizations like ASP can help students make it happen.

Student National Pharmaceutical Association (SNPhA)

This professional organization is sponsored by the National Pharmaceutical Association and was established at UMKC in 1980. Membership is open to all pharmacy, pre-pharmacy and allied health field students at UMKC. SNPhA seeks to assist the School of Pharmacy in its recruitment and retention efforts with ethnic minority students and to increase an awareness among others in the school, University and community about minority health care issues. One of its primary purposes is to provide pharmacy students with an organization that can deal with problems facing pharmacists in this country.

The National Community Pharmacy Association (NCPA)

The National Community Pharmacy Association is a national organization dedicated to representing pharmacists who practice in the independent retail setting. Membership in NCPA provides an excellent opportunity for students who are interested in independent retail practice to network and make contacts with pharmacy students and practitioners.

Rho Chi

The Alpha Omega chapter of this pharmaceutical honor society was established at UMKC in 1954. Eligibility is limited to students who have completed five semesters of the scholastic

work applicable toward the doctor of pharmacy degree. To be invited to membership, students must have a minimum GPA of 3.0, be in the upper 20 percent of their class and have shown evidence of good character and leadership.

Kappa Epsilon

Kappa Epsilon is a professional fraternity open to all pharmacy students, that supports women in pharmacy. The Omega Chapter of this national organization was established at UMKC in 1958. Each year the chapter sponsors certain worthwhile projects for the school and the community, such as the KE Directory of Pharmacy Students, Breast Cancer Awareness Month, Poison Prevention and a patient assistance program at the Jackson County Free Health Clinic. Individual members of KE also participate in service projects sponsored by ASP and UMKC.

Kappa Psi

This national professional pharmaceutical fraternity was founded in 1879 and offers membership to both men and women. The Gamma Theta Chapter of Kappa Psi was established at UMKC in 1957. Steeped in tradition, its purpose is to maintain the highest ideals of pharmacy through ethics, scholarship and fellowship. Many social and professional activities are planned each year with emphasis on campus and community service projects.

Phi Lambda Sigma

Phi Lambda Sigma is the national pharmacy leadership society which promotes the development of leadership in pharmacy, especially among pharmacy students. The society encourages participation in all pharmacy activities. Membership crosses fraternal and organizational lines to include pharmacy students, faculty, alumni and honorary members.

Scholarships, Special Awards and Financial Assistance

The Dean's List

At the end of each semester, the names of full-time doctor of pharmacy and bachelor of science in pharmaceutical science students whose term GPA is 3.5 or higher are placed on the dean's list. These students receive a letter of congratulations and a notation is placed on their permanent records. Students must complete a minimum full-time program of 12 graded hours to qualify for the dean's list. The credit/no credit option may not be used as part of the 12 hours.

Degrees With Honors

Students who meet the academic standards prescribed by the faculty will be graduated "with honors." The criteria for latin honors eligibility is as follows:

Pharm.D. Students

Summa Cum Laude

- Pharmacy GPA* greater than or equal to 3.750.
- No periods of probation.
- No incidents of unprofessional behavior.

No more than 5% of the graduating class will be awarded Summa Cum Laude honors. If more than 5% of the class qualifies under the criteria above, the GPA criteria will be raised and students below the revised GPA will be awarded their degrees with Magna Cum Laude honors.

Magna Cum Laude

- Pharmacy GPA* greater than or equal to 3.600.
- No periods of probation.
- No incidents of unprofessional behavior.

No more than 5% of the graduating class will be awarded Magna Cum Laude honors. If more than 5% of the class qualifies under the criteria above, the GPA criteria will be

raised and students below the revised GPA will be awarded their degrees with Cum Laude honors.

Cum Laude

- Pharmacy GPA* greater than or equal to 3.500.
- No periods of probation.
- No incidents of unprofessional behavior.

No more than 10% of the graduating class will be awarded Cum Laude honors. If more than 10% of the class qualifies under the criteria above, the GPA criteria will be raised and students below the revised GPA will be awarded their degrees without Latin honors.

* GPA for Latin honors is the School of Pharmacy GPA on all courses completed at UMKC through the end of the 9th semester of the professional program.

Bachelor of Science in Pharmaceutical Sciences (BSPS)

Summa, Magna and Cum Laude Latin Honors decisions for BSPS students will be awarded based upon an average of the GPAs of students receiving the BSPS during the previous two years.

- No more than 5% of the graduating class may be awarded the BSPS with Summa Cum Laude honors.
- No more than 5% of the graduating class may be awarded the BSPS with Magna Cum Laude honors.
- No more than 10% of the graduating class may be awarded the BSPS with Cum Laude honors.

Adjustments to the GPA minimums will be made if necessary in order not to exceed the maximum percentages. In addition, BSPS students must have had no periods of probation and no incidents of unprofessional behavior.

Graduation Awards Banquet

An annual awards recognition program is held at the end of the final term in conjunction with the pharmacy graduation banquet. At that time, recognition is given to graduating students for superior academic achievement, leadership, and service. Selection of the recipients, except where noted otherwise, is made by vote of the pharmacy faculty in conjunction with the scholarship and financial aid committee.

Achievers of Excellence Awards Ceremony

Each fall an awards ceremony is held to recognize those students in the School of Pharmacy who receive scholarships or awards from the school, the University or the school's constituent groups. Most of these awards are competitive and are confirmed by the scholarship and financial aid committee. During this ceremony, student leaders also are recognized for their efforts on behalf of the School and the University.

Doctor of Pharmacy Graduation Awards

Douglas Adcock Memorial Award

An annual cash award established in memory of Douglas Adcock, a 1977 graduate of the School of Pharmacy, is presented to a student who plans a career in the public health service or who exhibits the ability to overcome adversity with professionalism.

Alumni Award

The Alumni Association of the School of Pharmacy gives an engraved plaque to the graduate who has exhibited outstanding leadership in school affairs. Candidates are recommended by the scholarship and financial aid committee. Final selection is made by the board of directors of the Alumni Association.

The American College of Apothecaries Award

The graduating student who has shown outstanding scholastic achievement and participation in school activities receives an engraved silver bowl from the American College of Apothecaries.

APhA Academy of Students of Pharmacy Mortar and Pestle Professionalism Award

A replica of a rare Revolutionary War mortar and pestle is presented to the graduate who exhibits the ideals of professionalism and excellence in patient care and has demonstrated exceptional service and commitment to the profession of pharmacy through involvement in professional organizations and other extracurricular learning opportunities. This award is supported by McNeil Consumer Products Company.

American Pharmacists Association Service Award

A certificate is presented by the American Pharmaceutical Association to the graduating student who has done the most for the student branch of the association. Selection is made by the ASP Executive Board.

Facts & Comparisons Clinical Communication Award

A set of engraved marble bookends, with a complete library of Facts and Comparisons, is presented by the Facts & Comparisons Division of J.B. Lippincott Company, St. Louis, Mo., to a graduating student, recognizing high academic achievement and outstanding clinical communication skills.

First DataBank Medical Writing Award

An Evaluations of Drug Interactions loose leaf edition is presented to a graduating doctor of pharmacy student who has demonstrated excellence in medical writing.

GlaxoSmithKline Award

An engraved plaque and volumes 1 and 2 of the USP-DI from GlaxoSmithKline Pharmaceuticals of Philadelphia, Pa., is presented to a member of the graduating class for superior achievement in clinical pharmacy patient care.

Lilly Achievement Award

The Eli Lilly Company of Indianapolis, Ind., presents a trophy to a member of the graduating class for superior scholastic and professional achievement.

Mitzi McGee Memorial Award

An annual cash award established in memory of Mitzi McGee, a 1977 graduate of the School of Pharmacy, is presented to a female member of the graduating class who, while in school, has been active in professional pharmacy affairs, especially those which affect the status of women in pharmacy. Preference should be given to a married student. The recipient must be present at the graduation awards banquet to receive the award.

Merck Award

Merck & Company Inc. of Rahway, N.J., presents a Merck Manual and Merck Index to two graduating students for noteworthy academic achievement in the area of pharmaceutical chemistry.

Mylan Pharmaceutical Excellence in Pharmacy Award

Mylan Pharmaceuticals Inc. of Birmingham, Ala., presents a plaque and a U.S. savings bond to a graduate in the top 20 percent of the class who exhibits exceptional skills in the area of drug information dissemination.

The Natural Medicines Comprehensive Database Award

Recognition is presented to the senior student who has shown an interest in the use of natural medicines. The recipient also must have proven academic and extracurricular activities demonstrating outstanding promise in the assessment, evaluation and delivery of patient care related to the use of natural medicines. The recipient receives a copy of the natural medicines comprehensive database, a subscription to the Natural Medicines Continuing Education series and a certificate.

Perrigo Award

The Perrigo Company of Allegan, Mich., awards a stipend and hand-engraved wall plaque to a graduating student in recognition of excellence in nonprescription medication studies.

Pharmacists Mutual Award

A gold-embossed reference book or one year of pharmacists liability insurance is presented by the Pharmacists Mutual Insurance Co. of Algona, Iowa, to a graduate, based on academic achievement and professional pharmacy outlook.

Rho Chi Award

Honors are presented to a graduating student based on scholastic achievement, strengths of character, personality and leadership evidenced during residency in the School of Pharmacy. Selection is made by Rho Chi honor society.

Roche Pharmacy Communications Award

Roche Laboratories, a division of Hoffman-La Roche Inc. of Nutley, N.J., presents an engraved plaque to a graduating Pharm.D. student demonstrating outstanding communication skills in clinical pharmacy coursework.

TEVA Outstanding Student Award

A certificate and cash award are presented by TEVA Pharmaceuticals of Sellersville, Pa., to a graduate. The criteria are scholastic achievement, professional pharmacy outlook and participation in school activities.

United States Public Health Service Excellence in Public Health Pharmacy Practice Award

A framed certificate and book award is presented to a graduate whose public and community service efforts are recognized.

Fall Awards

Wright V. and Gladys A. Bartholomew Scholarship

This scholarship is awarded competitively to a Pharm.D. student entering the third semester of the professional program in the School of Pharmacy. The student must have expressed interest in entering community pharmacy practice after graduation. Pending satisfactory academic performance, this scholarship can be renewed for a maximum of four additional semesters.

Mary Bisceglia Memorial Scholarship

A gift was made by Bud Bisceglia, a 1953 alumnus, in memory of his wife, Mary, for a memorial scholarship. The Mary Bisceglia Memorial scholarship is awarded to a second- or third-year Pharm.D. student interested in community pharmacy practice.

Lewis Bratt Scholarship

This scholarship will be awarded to a student who has an interest in independent community pharmacy. Financial need will be taken into consideration.

Century Club Grant

The UMKC Pharmacy Foundation awards this grant to a third-year Pharm.D. student who intends to practice in a hospital or other clinical setting.

CVS Community Pharmacy Scholarships

CVS awards scholarships to four Pharm.D. students entering the second professional year who plan to practice community pharmacy after graduation.

Dean's Advisory Council Scholarship

This scholarship shall be awarded to a professional pharmacy student in their third, fourth or fifth year who demonstrates extraordinary leadership qualities. Preference shall be given to a student who has held an elected office while in pharmacy school or has developed an innovative service project. Financial need should be taken into consideration.

Lewis D. DeClerck Memorial Scholarship

This scholarship is awarded to a second-year Pharm.D. student who ranks in the top 10 percent of the class and who exhibits leadership qualities.

Leslie Eisenbrandt Scholarship

A stipend is awarded to a student in years three through five of the professional pharmacy program who is excelling academically and qualifies for financial aid.

Erickson Family Scholarship

Preference for this award will be given to a student who is a direct descendant of J. Stephen Erickson and/or K. Clyde Erickson and/or their brothers or sisters; employed by The Drug Store of Cameron, Missouri and from a town of less than 20,000 in population or is employed by a privately held (independent) pharmacy company. Applicants must have a letter of recommendation from a currently employed pharmacist of The Drug Store of Cameron, Missouri.

Fendler Family Scholarship

One scholarship will be disbursed each year to a student in the School of Pharmacy who is eligible to receive financial aid and is in good standing academically. Preference will be made to a minority applicant who is an entering first year professional degree student with demonstrated leadership experience and significant financial need.

Spencer S. Glenn Memorial Scholarship

In memory of Spencer S. Glenn, a scholarship recognizing the superior pursuits of a doctor of pharmacy student with a record of clinical research abilities and academic achievement was established. Selection preference is given to married students who are U.S. citizens and Missouri residents.

The Glenski Family Scholarship

An award is presented to a doctor of pharmacy student in years three through five of the professional pharmacy curriculum who has maintained a cumulative School of Pharmacy GPA of 3.0. The student must be involved in extracurricular activities with a community service emphasis. Preference will be given to a student who has a family member who is either in a health-care profession or is a UMKC alumnus.

Travis and Maqual Graham Scholarship

One student scholarship will be disbursed each year to a fourth or fifth year Pharm.D. student interested in obtaining clinical post-doctoral training, who is in good academic standing, and is involved in community healthcare initiatives. The recipient must also be eligible to receive financial aid in the current academic year.

Greater Kansas City Society of Health-System Pharmacists (GKCSHP) Book Scholarship

This scholarship is awarded by the GKCSHP to a second-year doctor of pharmacy student who plans to pursue a career in hospital pharmacy.

George Guastello Scholarship

This scholarship was established in 1996 by the Guastello family and recognizes a deserving second through fifth year pharmacy student interested in practicing in a community pharmacy setting. Applicants' financial need will be considered.

Harvey H. Haynes Scholarship

This scholarship shall be awarded to a third-year pharmacy student planning to work in an independent pharmacy in a rural area with a population less than 10,000. Financial need is not a consideration.

Bruce J. "Bud" Huber Memorial Scholarship

This is scholarship for a Pharm.D. student in years two through five who has a minimum cumulative GPA of 3.0 and documented involvement in extracurricular activities in the area of service. Priority should be given to a pharmacy technician or intern of Express Pharmacy, or to an older, returning student. Financial need is considered.

Richard D. Johnson Undergraduate Pharmaceutical Sciences Award

This award is given to undergraduate and professional students in the last year of the program who are engaged in graduate-level laboratory research projects. Financial need is not to be considered. The dean and donor or his designee shall select the recipient.

Kilgore's Medical Pharmacy Scholarship

The recipient of this scholarship must be in the high category for financial aid. The recipient must be enrolled in the Pharm.D. satellite program on the University of Missouri-Columbia campus. Preference shall be given to students who graduated from a high school in Boone, Cole, Moniteau, Cooper, Howard, Randolph, Audrain, or Callaway counties in Missouri. This award is renewable for up to four years for incoming pharmacy students if the recipient continues to meet the criteria and is academically eligible to receive financial assistance.

Kenner & Kavanaugh Scholarship

This scholarship shall be awarded to a doctor of pharmacy student based on evidenced financial need.

Rocky and Laurie Levell Scholarships

These scholarships shall be awarded to two Pharm.D. students who are eligible to receive financial aid and are in good standing academically. Each student should demonstrate a compassionate attitude toward others and be involved in extracurricular activities in the community. Preference will be given to students with an interest in geriatric care who plan to practice in an independent or community pharmacy upon graduation.

Lindman-Gershman Scholarship

A scholarship for a student in the doctor of pharmacy program with financial need.

Alexander and Mary Margolis and Bernard A. Margolis Perpetual Memorial Fund

A bequest through the estate of Bernard A. Margolis was established in 1994 for a worthy pharmacy student enrolled in years one through five of the professional program who has financial need.

J. Leo McMahan Grant

A stipend is awarded to a second professional year student who represents the caring and professional attitudes of Leo McMahan.

Joe McNerney Pharmacy Leadership Scholarship

This award is given to any doctor of pharmacy student who has demonstrated leadership abilities. Financial need should be taken into consideration.

Medicine Shoppe International Scholarship

Doctor of pharmacy students with an interest in community pharmacy or community oriented extracurricular activities may receive this scholarship. This award is not given every year.

Mid-Missouri Society of Health-System Pharmacists Scholarship

This scholarship will be awarded to a student in the UMKC School of Pharmacy satellite program located on the

University of Missouri-Columbia campus based on a point system. Points are assigned by the following criteria: a student who is a member of the Missouri Society of Health-Systems Pharmacists; student is presently employed by a health-systems pharmacy; student is a high school graduate of Boone, Cole, Cooper or Callaway counties in the state of Missouri; student is currently a Missouri resident and student should be in the high need category for financial aid. Student may re-apply and receive the award for more than one year.

Missouri Pharmacy Foundation Scholarship

The Missouri Pharmacy Foundation provides a scholarship to a third year Pharm.D. student who is a Missouri resident. The recipient should be on track with his or her class and have maintained a minimum cumulative 2.5 GPA during the first two years of the pharmacy program. The recipient should be planning on a career in Missouri and have demonstrated involvement in his or her community.

Tim Mitchell Scholarship

This scholarship shall be awarded to an active UMKC National Community Pharmacists Association student member in their third, fourth, or fifth professional year in the Pharm.D. program. The student must be in good standing.

Timothy G. Mitchell Scholarship

This scholarship is awarded to one Pharm.D. student in the second through fifth year in good academic and professional standing. The student must have a stated career interest in community pharmacy, with preference given to those with interest in independent pharmacy.

National Association of Chain Drug Stores (NACDS) Scholarship

Awarded to a Pharm.D. student who intends to pursue a career in chain community pharmacy practice after graduation. Financial need is taken into consideration.

Jim Newman Memorial Scholarship Fund

A stipend is awarded to a doctor of pharmacy student in years 3-5 who has financial need. Preference is given to a student from Joplin or Southwest Missouri.

Nyberg Pharmacy Independent Pharmacy Scholarship

An award is made available to a doctor of pharmacy student, regardless of practice interests or year in school, who maintains a minimum 2.5 GPA and is a Missouri resident. Financial need is considered. This award not given every year.

Owen Healthcare Scholarship

A matching fund program through Owen employee donations to provide a scholarship for a top academically ranked second- or third-year pharmacy student with financial need. This award is not awarded every year.

Ozark Society of Health-System Pharmacists Award

Awarded to a full-time student enrolled in years three through five of the doctor of pharmacy program who has a 3.0 GPA or higher. Preference will be given to students from the Southwest Missouri area (Vernon, Barton, Jasper, Newton, McDonald, Barry, Lawrence, Dade, Cedar, Polk, Greene, Christian, Stone, Taney, Ozark, Douglas, Webster, Wright, Texas, Howell, Dallas and Laclede counties).

PBA Health / TrueCare Pharmacy Scholarships

PBA Health / TrueCare Pharmacy, the Midwest's first interdependent chain of independent pharmacists, awards scholarships to deserving doctor of pharmacy students in the last three years of the curriculum. Students must have a minimum of 500 intern hours in independent pharmacy and a minimum 2.5 GPA.

Pharmacists Mutual Scholarship Award

This scholarship is awarded annually by the Pharmacists Mutual Insurance Cos. of Algona, Iowa, to a second-year doctor of pharmacy student who intends to practice pharmacy in a community setting after graduation.

Pharmacy Foundation Memorial Scholarship

Awarded to a second-year student recognized for his or her earnest pursuit of a doctor of pharmacy degree and intent to practice in a community setting after graduation.

The RAN Institute Award

Awarded to a female pharmacy student who has demonstrated an interest in and documented activities of strong entrepreneurial ambitions, active involvement in UMKC athletic programs and financial need.

Red Cross Pharmacy Scholarship

Preference for this award will be given to a student who is: a direct descendant of Benjamin R. Hartwig, employed by Red Cross Pharmacy and/or from a Red Cross Pharmacy market area, from a town of less than 20,000 in population, or is employed by a privately held (independent) pharmacy company. Each applicant must have a letter of recommendation from a currently employed pharmacist of Red Cross Pharmacy.

Stanley M. Reinhaus Family Foundation Scholarship

Second-year doctor of pharmacy students with a minimum 2.75 GPA may apply for this award. Applicants must be interested in hospital or community pharmacy, be a Missouri resident and plan to work in Missouri after graduation with no plans of pursuing an advanced degree. Applicants must have financial need. The award is renewable.

Toni Sena Memorial Scholarship

This scholarship shall be awarded to a student in the Pharm.D. program with a minimum 2.5 GPA and to a student who shows evidence of an earnest pursuit of a pharmacy degree.

The Joseph G. Shalinsky Scholarship

This scholarship was established in 1996 by the family of Joseph G. Shalinsky. The scholarship recipient must have achieved academic success (minimum 3.0 cumulative GPA), and an interest in practicing in a community pharmacy setting after graduation. Applicants' significant financial need should be demonstrated.

Leo Shalinsky Scholarship

The recipient of the award should be a second- or third-year Pharm.D. pharmacy student interested in practicing in a retail pharmacy. The applicant must have a minimum 2.5 GPA average, be involved in extracurricular activities and have a financial need.

Morris R. Shlensky Award

The Morris R. Shlensky award was originally made available through officers of the Katz Drug Co., (now CVS), specifically for professional pharmacy students. Financial need or high scholastic achievement should be demonstrated. The award is renewable for one additional semester.

Smock Family Scholarship

This scholarship shall be awarded to a third, fourth or fifth year student that currently is in good standing, currently obtains the bulk of his/her academic funding through financial aid programs, and who has an interest in community or independent pharmacy practice.

The Anthony J. Spalitto, Sr. Scholarship

Awarded to a doctor of pharmacy student in years two through four who has a minimum 2.5 GPA and has expressed interest in independent community pharmacy. Financial need will be taken into consideration.

Bruce and Shirley Stocker Scholarship

The applicant for this scholarship, established in 2000, must be either a Missouri or Kansas full-time resident in years one through five of the professional pharmacy program. The applicant must have maintained a minimum 3.0 GPA, have expressed an interest in pursuing a career in institutional pharmacy and be or planning to be involved in the appropriate professional pharmacy organizations (i.e., MSHP, KSHP, ASHP). Financial need will be taken into consideration.

Evelyn F. Suffecool/Esther C. Plank Scholarships

The funds of the Evelyn F. Suffecool and Esther C. Plank endowments will be used to award scholarships to Pharm.D. students.

Harry N. Tishk Scholarship

Awarded to a first professional Doctor of Pharmacy student with evidence of financial need. The student must have been a provisional student the year prior to receiving the award. This scholarship fund was created in honor of Harry N. Tishk, a 1964 alumnus.

Fred Tonnies Scholarship

This scholarship shall be awarded to a doctor of pharmacy student based on a point system. Points are assigned by the following criteria: a student who is a graduate of a high school in Boone County, Mo., is a past or current employee at the University of Missouri-Columbia Hospitals & Clinics, minimum cumulative 3.6 GPA and financial need.

Phyllis Vaughn Scholarship

This scholarship will be awarded to a doctor of pharmacy student in the second through fifth year of the professional pharmacy program who expresses a caring and friendly attitude toward others. Preference will be given to a student who exemplifies this attitude through involvement in extracurricular activities helping people. Financial need will be taken into consideration.

Walgreens Student Scholarship

This is an annual award to a pharmacy student entering their final professional year. The student should have demonstrated outstanding leadership and communication skills and have an interest in community pharmacy practice.

Wal-Mart Scholarship

The Wal-Mart Corporation awards this scholarship to a fourth- or fifth-year Pharm.D. student who has an interest in pursuing a career in community pharmacy and who has demonstrated leadership qualities and high scholastic standing. Financial need should be considered.

Mathew W. "Bill" Wilson Scholarship

In honor of Matthew W. "Bill" Wilson, a 1950 alumnus of the school, this scholarship is awarded to a third-year professional student whose integrity and professionalism matches that of Bill Wilson.

Larry Windmoeller Scholarship

This scholarship shall be awarded to a doctor of pharmacy student based on a point system. Points are assigned by the following criteria: a student who is a graduate of a high school in Boone County, Mo., is a past or current employee at the University of Missouri-Columbia Hospitals & Clinics, minimum cumulative 3.6 GPA and financial need.

Other Financial Assistance and Awards**American Institute for the History of Pharmacy Certificate**

This award recognizes and encourages superior achievement in pharmacohistorical study or activity by a pharmacy student.

Gracia Bremer Loan Fund

An endowment through the unitrust of Gracia Bremer and Mercantile Bank was established in 1996 for pharmacy students enrolled in years one through five of the first professional program who need additional financial support while pursuing a pharmacy degree.

George H. Hargrave Pharmacy Student Loan Fund

An endowment through the unitrust of George H. and Edith L. Hargrave was established in 1994 for pharmacy students enrolled in years one through five of the first professional program who need additional financial support while pursuing a pharmacy degree.

Kmart Scholarship

Second- or third-professional-year Pharm.D. students with an interest in pursuing a career in community pharmacy and who are employed by Kmart as a summer intern are eligible for the Kmart Scholarship. A special application is required and can be obtained through the Kmart Corp.

Facts & Comparisons Scholarship for Postgraduate Study in Drug Information

This \$2,500 scholarship is awarded to a Pharm.D. candidate entering the last year of the program and who is interested in pursuing advanced training in drug information pharmacy practice.

Searle Fellowships in Pharmacy

First-, second- and third-place awards beginning at \$7,500 are awarded to Pharm.D. candidates entering the last year of the program who show leadership potential, professional development and educational achievement.

UNITED DRUGS Scholarship Program

A scholarship for a fourth- or fifth-year doctor of pharmacy student involved in pharmacy related student affairs and service to the community, preferably in a leadership capacity. The qualified student must have a minimum overall 2.5 GPA and an interest in independent pharmacy practice.

Academic Regulations and Requirements**Class Attendance**

Regular attendance at classes is strongly recommended for students to progress satisfactorily through the pharmacy curriculum. Required attendance, however, is left to the discretion of the individual instructor. Students are responsible for familiarizing themselves with all course requirements and assignments.

Students are to report absences to instructors as outlined in individual course policies (e.g., syllabus, course outline). Absences for official school or University activities will be handled through the dean's office. The dean's office must be notified prior to the event or activity. In either event, any notice sent to instructors is for purposes of information only and does not relieve students of any responsibilities for completing work missed in their absence or non-adherence to individual course policies.

Absences from Scheduled Examinations

Unless specified otherwise on the course syllabus, students may be excused from a scheduled examination if they notify the school of their absence in advance of the examination and present a statement from their private physician confirming their illness on their return. The manner in which a justified absence from an examination will be made up will be determined by the course instructor. Instructors do reserve the right to hold examinations outside of regularly scheduled class

times. Such examinations will be noted in the University schedule of classes.

Students will not be given an opportunity to make up an unexcused absence from an examination, and their scores shall be recorded as zero for a numerically scored exam and F for a letter-graded examination.

The only exceptions to this rule shall be when the student's absence is traumatic in nature (e.g., automobile accident, sudden death in family, etc.) or when prior arrangements have been made with the course instructor.

Immunizations

Adequate protection for students and patients against certain diseases requires standard immunizations. Submission of immunization certificates are a condition of acceptance and must be on file in the Office of Experiential Programs prior to taking part in the first Academic Service Learning experience and must remain current through the last clinical practice rotation. Students are required to have:

- The three-injection series of the Hepatitis B vaccination.
- Vaccination against or proof of chicken pox immunity.
- Two MMR (measles, mumps, rubella) vaccinations.
- A yearly tuberculin skin test (a chest x-ray is required if skin test is positive) completed as a condition of advancement.
- Additional tests may be required.

Newly enrolled students will receive information regarding immunization provider options at orientation.

Academic Loads

All coursework in the pharmacy curriculum is sequential and success depends upon the instruction and content from the previous semester and builds upon knowledge needed for subsequent semesters. Pharmacy students must enroll for the total program as outlined for each semester in the most current version of the curriculum.

Exceptions to Pharmacy Curriculum

Students are expected to satisfactorily complete all required courses and noncredit requirements in the pharmacy curriculum. Any exception to the normal curriculum must be approved by the school's Committee on Admissions and Academic Requirements. For a student to be excused from any of the required courses, a petition for exception must be submitted to the committee for its consideration at least one month prior to the start of the semester for which the exception is being requested.

Concurrent Enrollment

A pharmacy student may not enroll at another institution while also enrolled at UMKC unless prior approval has been obtained from the Committee on Admissions and Academic Requirements. Approval requires completion of a petition for exception or a Kansas City Area Student Exchange Program (KCASE) form. KCASE applications are available from the Registrar's Office.

Grading System

Refer to the grade-point system listed in the General Undergraduate Academic Regulations and Information section of this catalog and to the individual course syllabi. Note: Letter grade changes must be made no later than four weeks from the beginning of the next semester, to include summers, unless a shorter time frame be affixed by a course coordinator. This policy applies to School of Pharmacy division courses only and does not apply to incomplete grades.

Academic Probation

Doctor of Pharmacy students are placed on academic probation if they receive any of the following:

- Less than a 2.0 term GPA.
- Receipt of a D grade in any coursework completed during a single semester.
- Less than a 2.0 cumulative GPA during one semester.

To remove themselves from probation, students must receive not less than a 2.0 term GPA, receive no additional grades of D, F, WF, or No Credit, and must raise their cumulative GPA above 2.0 in the next academic semester.

Academic Dismissal

Doctor of Pharmacy students are considered ineligible to progress in the School of Pharmacy under any of the following conditions:

- Receipt of a D grade in any coursework in a single semester while on academic probation.
- Receipt of less than a 2.0 term GPA while on academic probation.
- Receipt of an F, WF, or a No Credit grade in any required course.
- Receipt of two or more grades of D in any coursework in a single semester.
- Placement on academic probation for more than two non-consecutive terms.
- Receipt of two consecutive terms of less than a 2.0 cumulative GPA.

All such cases of probation or ineligibility will be reviewed by the school's Committee on Admissions and Academic Requirements to determine the reasons for the unsatisfactory progress. A student may be asked to appear before the committee to discuss probable causes for their academic difficulties.

The committee will then either propose a program whereby the student might make up the deficiencies or recommend termination.

If a student's petition for readmission is approved, the student must sign an agreement for the program proposed by the committee to correct the deficiencies and will be governed by the committee's proposal until the conditions stipulated in it have been satisfactorily met.

First Professional Year students who become academically ineligible to continue at the end of the first semester may not petition for re-admission and must reapply to the Pharm.D. program through the regular admission process.

Students who withdraw from required coursework are ineligible to continue in the regular curriculum unless course equivalents can be completed during the summer term. A student who withdraws from a required course will not be allowed to matriculate to the next semester.

All students are given the terms governing academic performance on entering the School of Pharmacy.

Student Conduct

All students entering the School of Pharmacy receive a copy of the University of Missouri Student Conduct Code. A student proved to have illegally obtained, sold or used a controlled substance shall be permanently dismissed from the School of Pharmacy.

Student Honor Council

All students entering the Doctor of Pharmacy program receive a copy of the school's Honor Council Procedures and Standards of Professional and Ethical Behavior. These policies and procedures provide peer and faculty review to ensure these standards are upheld by each pharmacy student. In all cases of academic dishonesty, the instructor shall make an academic assessment about the student's grade on that work and in that course.

Standards of Professional Attire and Classroom Etiquette

Upon acceptance and entry into the School of Pharmacy, students begin a process of developing the knowledge, skills and attitudes that creates the fundamental core of the profession of pharmacy. The development of these competencies to a practitioners level takes several years, but early initiation of these professional behaviors promotes the development of professionalism. In order to provide students direction to this end, upon entering the Doctor of Pharmacy program all students receive a copy of the school's Standards of Professional Attire and Classroom Etiquette and must abide by these standards. Abiding by these Standards at the UMKC School of Pharmacy is a piece of the educational process that establishes esteem and responsible behaviors.

Noncredit Requirements

All doctor of pharmacy students are expected to actively participate in professional activities offered or required by the School of Pharmacy. These activities mirror those expected in professional practice and are intended to better prepare the student for professional life. The following are requirements for all Pharm.D. students:

1. Certification in Basic Cardiac Life Support (completion of the Health Professionals BCLS is strongly encouraged over the general BCLS certification) each year starting prior to enrollment in the Pharmacy 7310 course. Certification must remain current throughout the entire program and is required for progression to the next professional year.
2. Certification in First Aid each year starting prior to enrollment in the Pharmacy 7310 course. Certification must remain current throughout the entire program and is required for progression to the next professional year.
3. Licensure as a Missouri Intern Pharmacist each year starting prior to enrollment in the Pharmacy 7310 course. Licensure must remain current throughout the entire program and is required for progression to the next professional year.
4. Proof of pharmacy intern liability insurance prior to enrollment in the Pharmacy 7310 course and valid throughout the program.
5. Proof of all required immunizations as noted prior to enroll in the First Professional Year [two MMRs] and Second Professional Year [Hepatitis B, Chicken Pox, negative TB] and valid throughout the program.
6. Attendance at all Pharmacy Grand Rounds unless previously excused in writing in advance of the event by the dean or designee.
7. Attendance and participation during the third and fourth professional year in the School of Pharmacy Professional Dedication Ceremony unless previously excused in writing in advance of the event by the dean.
8. Attendance and participation during the fifth professional year at the School of Pharmacy Career Enhancement and Professional Preparation Day unless excused by the dean or designee.
9. Attendance and participation in seminars, colloquia and workshops thought to be beyond the scope of education provided in the curriculum as requested by faculty and staff. Attendance is required unless previously excused in writing in advance of the event by the dean or designee.

Written English Proficiency Test Requirement

Students enrolled in the doctor of pharmacy and bachelor of science programs must complete the Written English Proficiency Test (WEPT). The University requires that all

students successfully complete English Composition 110 and English 225. At the end of English 225, the WEPT is administered. Any student failing to pass the WEPT twice will be required to take English 299. Completion of English 299 will not count toward the degree, however will satisfy the WEPT requirement for students who earn a C- or better in the course. All students who have completed English Composition I and II elsewhere are required to take the WEPT. They, too, must abide by the results of the exam to be eligible for graduation. The WEPT is given twice each semester; the dates of the test appear regularly on the academic calendar.

Directed Individual Study

The opportunity to undertake independent study is offered through Pharmacy 7497 courses. These courses may satisfy part of the professional elective requirement. Generally, the student receives the individual attention of a professor in the chosen field of study, and the project may involve any topic considered appropriate to the academic needs of the student. Once the student and instructor have agreed on a project, a permission-to-enroll form that includes an outline of the proposed course of study signed by the instructor must be reviewed and approved for credit by the school's committee on admission and academic requirements. This must be done at least one month prior to the start of the term in which the coursework is to commence. National or local competitive proposals or any part of a student organizational initiative may not be used for Directed Individual Study proposals.

No more than five credit hours of Pharmacy 7497 courses may be counted toward the degree requirements. Pharmacy 7497 courses are offered on a credit/no credit basis only.

Off-campus Learning Experiences

All Pharm.D. students are required to participate in experiential learning rotations. All of the experiential learning courses are conducted in actual practice settings (e.g., community, hospitals, nursing homes, etc.) under the supervision of clinical practitioners/instructors who serve as exemplary role models in their particular types of pharmacy practice. Students are expected to provide their own transportation to sites assigned for the experiential learning.

Experiential sites may be located outside the Kansas City area. During the clerkship rotations, living and travel expenses are the responsibility of the student.

Criminal Background Checks

The University on behalf of the School of Pharmacy agrees to inform students that as a condition of participating in any affiliation [clinical experiences to include ASL and clinical clerkship rotations], they must obtain and provide verification of a current, criminal background check prior to that student's assignment at an affiliated hospital/institution. The affiliated hospital/institution hereby understands and agrees that the decision to permit a student to participate at that affiliated hospital/institution on the basis of the result of any criminal background check remains solely with the affiliated hospital/institution and not the University. Failure on the student's part to submit to criminal background checks will delay progression or render a student unable to complete the professional degree program.

Liability Insurance

Students who are completing internship requirements or who are enrolled in academic service learning or clinical practice coursework must obtain pharmacy liability insurance. Students must be covered by pharmacy liability insurance prior to the first day of a school, sponsored service learning experience or experiential rotation. Students should contact the Pharmacy Student Services Office or the Office of Experiential Programs for information.

Drug Screening

Pharmacy students may be subject to random drug screens as a condition of participation in patient care activities (Academic Service Learning, clinical rotations). Students wishing assistance for a drug related impairment may voluntarily seek counsel through the UMKC Counseling Center, the School of Pharmacy's PAALS program, or other available treatment centers. Treatment does not guarantee a student's participation in patient care activities.

Outside Employment

Because of the intensity of the professional curriculum, students are strongly urged to limit outside employment to no more than 10 hours per week while enrolled in the school. Students experiencing academic difficulties as a result of commitments to outside employment may be asked by the school's committee on admissions and academic requirements to stop outside work until their academic difficulties are resolved.

Note: Program requirements and course descriptions are subject to change without notice after publication of this catalog. Pharmacy students are encouraged to remain in contact with their faculty adviser and professional staff in the Pharmacy Student Services Office to stay apprised of program requirements in effect.

State Licensure Requirements

Students planning to practice the profession of pharmacy are required to satisfy the licensure requirements of the state in which they intend to practice. Licensure requirements vary, therefore, information concerning these requirements may be obtained by contacting the board of pharmacy of the state concerned.

The state of Missouri requires that an applicant for registration be 21 years of age, a graduate of an accredited school of pharmacy approved by the state's board of pharmacy and have on file with the board proof of 1,500 hours of internship experience in a retail/community or hospital pharmacy under the supervision of a registered pharmacist/preceptor. Students attending a pharmacy school in the state of Missouri must complete three rotations through the school's externship program of at least 160 hours each, for a total of 480 hours which will satisfy the internship requirements. Refer to the Missouri Board of Pharmacy Web site <http://pr.mo.gov/pharmacists.asp> for the most up-to-date information as requirements can change at any time. Kansas internship requirements are presently 1,500 hours also.

Continuing Education Programs

The School of Pharmacy is making a significant contribution to members of the pharmaceutical profession and allied health professionals by providing continuing education in pharmacy for the improvement of professional competence as it relates to drug utilization in disease states. Area needs, as they are identified by the profession, are met through conferences, short courses, home-study courses and seminars. The School of Pharmacy has been accredited as a provider of continuing education by the American Council on Pharmaceutical Education. For more detailed information on offerings and services available, contact the associate dean.

Pharmacy (PHARM) Courses

7100A Introductory Topics In Pharmacy I (0.5). Discussion of the system of pharmacy, role of pharmacist as provider of health care, their education and professional organizations. Class meets for two hours once per month. Prerequisite: Admission restricted to provisionally admitted students in the School of Pharmacy. Credit/no credit. Offered: Fall Restrictions: AU 50

7100B Introductory Topics In Pharmacy II (0.5). Continuation of Phar. 100A. Credit/No credit. Offered: Winter Restrictions: AU 50 Prerequisite: Pharm 100A

7101 Professional Skills Development I (2). This course introduces students to the profession of pharmacy and professional responsibilities and roles of a pharmacist. Students will complete and present a group project solving a community-based health issue as part of this course. This is the first of three courses with an integrated curriculum focused on professional skills development. Prerequisites: Admission to the Pharm. D program. Restrictions: AU 52 Offered: Fall Two 1-hour class sessions are held per week.

7104 Professional Skills Development III (3). This course provides instruction in performing the necessary calculations involved with the practice of pharmacy including, but not limited to, calculations, involved with dosing patients by body weight and body surface area, preparing iso-osmotic preparations, and the extemporaneous compounding of pharmaceutical formulations. In addition, professional skills are developed with traditional dispensing of pre-manufactured prescription drugs, extemporaneous compounding, preparing intravenous products, and instruction in the acquisition and interpretation of clinical laboratory data associated with several disease states. Prerequisite: PHAR 414

7110 Pharmacy Calculations (2). This course provides instruction in performing the necessary calculations involved in the practice of pharmacy and the dispensing, manufacturing and preparation of dosage forms. Topics covered include but are not limited to: fundamentals of pharmaceutical calculations (numbers,numerals,exponents,ratios,percentages,proportions and fractions); International System of Units; pharmaceutical measurements; interpretations of medication orders and prescriptions; density,specific gravity and specific volume;patient specific parameters involved in dosing(surface area,weight and age); isotonicity and buffer solutions; milliequivalents,millimoles and milliosmoles;dilution,concentration and alligation;and,reducing and enlarging formulas. The ability to apply principles and formulas to solve pharmaceutically relevant problems related to the above listed topics is an outcome for this course. Students must have an understanding of mathematical principles to include algebra and calculus. Prerequisite:Math 210Offered:Winter Semester. Restrictions: AU 51&52

7125 Medical Terminology (1). This course will provide the necessary information towards proficiency in reading and understanding the meaning of common medical terminology. This ability will provide a foundation for student learning in courses that rely on medical terminology to explain physiologic and clinical processes. Prerequisite: Admission to the Pharm D program. Offered: Fall Restrictions: AU 52

7151 Introduction To Pharmacy Law (1). This course will provide an introduction to the federal and state laws that pertain to the practice of pharmacy. One hour of lecture per week. Offered: Fall Restrictions: AU 52

7202 Pharmaceutics I (4). Physicochemical properties of drug systems with consideration of incompatibilities and stabilization of pharmaceutical dosage forms, and physicochemical properties affecting drug action, degradation and bio availability. Three hours lecture and three hours laboratory a week. Prerequisite: PHARM 110 & 104 Offered: Fall Restrictions: AU 51 & 52 (Second Year Professional Standing)

7203 Pharmaceutics II (3). Discussion of pharmaceutical processes, equipment and material used in drug delivery systems and the preparation and evaluation of solid delivery systems and parenteral products. Three hours lecture and three hours laboratory a week. Prerequisite: Pharmacy 202. Restrictions: AU 51 & 52 (Second Year Professional Standing)

7203L Pharmaceutics II Lab (1). In this lab course students will perform hands on pharmaceutical processes, use manufacturing equipment, and prepare formulations in which selected dosage forms are manufactured and evaluated. This is a required lab for BS in Pharmaceutical Science students and a professional elective option for Pharm.D. students. Prerequisite: Pharmacy 202 Co-requisite: Pharmacy 203 (AU 51 students only)

7245 Top 200 I (0.5). This course requires the student to commit basic information about the Top 200 most prescribed drugs to memory. Prerequisite: Successful completion of Pharm D courses through semester 4. Offered: Fall and Winter Restrictions: AU 52 Level A

7266 Medical & Medication Error Evaluation & Management (3). A course designed to discuss the current body of evidence with respect to medical quality, medication errors, and strategies used to improve quality & minimize error rates. At the completion of the course, the student should be able to (1) review and synthesize evidence within the literature; (2) describe te policy framework designed to improve health care quality; (3) describe characteristics and factors that enable & encourage providers to improve the quality of care; (4) describe common causes of medication errors; (5) differentiate strategies to prevent errors; (6) correlate medication errors and specific disease states. Prerequisite: None Offered: Winter Restrictions: AU 52 Level B

7303 Pharmacokinetics And Biopharmaceutics (4). Study of pharmacokinetic models and equations; the concepts of the rate processes associated with, and the physical and physiological factors affecting absorption, distribution, and elimination of dosage forms. The concepts of bioavailability will be presented so as to prepare the student to evaluate

bioavailability data. Three hours lecture and one two-hour discussion period per week. Winter. Restrictions: AU 51 & 52 Level A

7310 Academic Service Learning I (1). Students will be assigned to KC area service organization as a part of the Center for the City's Health Ambassadors program. A minimum of 30 contact hours must be completed during the assigned semester. Health education will be the primary focus. Prerequisite: Successful completion of Pharm D courses through semester 4. Offered: Fall/Winter semester Restrictions: AU 52

7313 Career Planning (1). This course enables students to engage in the study of career opportunities in the areas of industry, hospital/clinic practice, retail and managed care settings. Pharmacy opportunities are explored through lecture and discussion, guest speakers in the various areas and student exploration with business contacts and research. Topics include understanding career opportunities, achieving one's professional goals, compensation packages and negotiations, and designing a path to accomplish career objectives. Offered: Fall Restrictions: AU 52 Level A&B

7323 Islam And Modern Practice Of Medicine And Pharmacy (1). An elective course that addresses the significant contribution of Muslim physicians and scientists to the modern practice of medical sciences and the impact of the Islamic culture on issues related to health care. Credit/No Credit Prerequisite: None Restrictions: None Offered: Fall and Winter

7325 Business, Professional & Technical Writing For Pharmacy Students (2). This course will develop writing skills relevant for contemporary pharmacists. These skills will be used later in the curriculum and in practice. Students will develop competency by completing individual and group exercises on business writing, technical writing, patient education and health literacy. Prerequisites: English 110 and 225 and Pharm 7414. Offered: Fall

7326 Evidence Based Medicine (5). Pharmacists, if they are to assume the role of "medication expert" must have the ability to evaluate the medical literature and use the results of this evaluation to make evidence-based patient care decisions. To do this, pharmacists will need to assimilate existing information, create and assimilate information or create new information. The disciplined approach that evidence-based practice requires will assure the highest quality of problem solving and decision making possible by the pharmacist for patients, consumers and other healthcare providers. This course provides students with tools to evaluate the literature in a critical manner. The student will learn how to integrate information from multiple sources to make more complex healthcare-related decisions. A key aspect of the course is to provide confidence and ability in assimilating existing information into recommendations/decisions. Less emphasis will be placed on the creating of new information. Throughout the course, the student will observe and participate in applying these tools for evidence-based practice to real pharmacy issues in order to make individual patient care and population-based decisions. Prerequisite: PHARM 7420 and PHARM 7325 Co-requisite: PHARM 7485P

7341 Medicinal Chemistry I (3). This course is the study of medicinally active substances, both natural and synthetic, which describes their chemical properties, their mode of action, their structure-activity relationships and their metabolic rate. Starting with their origin, it is shown how drugs in a series are developed by chemical modification, quantitative structure activity relationships and receptor theory. The chemical properties of a drug are described and explained. The mode of action of the drug is explained on a biochemical basis whenever possible. Once a drug has had its medicinal effect, it is excreted or metabolized. Reasons for excretion or metabolism are explained. Three hours lecture per week. Prerequisite: Chem 322R. Corequisite: LSBIoc 365G. Offered: Fall.

7344 Medicinal Chemistry II (3). This course is a continuation of Pharmacy 341. It will focus on classifying drugs based on chemical and/or pharmacological properties. The pharmacophore concept and structure-activity relationships will be emphasized. We will also examine the influence of organic functional groups on physicochemical properties of drugs and eventually their pharmacological activities. Syntheses and metabolism of drugs will also be discussed. The metabolism will focus on organic functional group transformations. Three hours lecture per week. Prerequisite(s): PHAR 341 & LSBIoc 365G. Corequisite: LSBIoc 366G. Offered: Winter.

7345 Top 200 II (0.5). Same as Top 200 I, however additional information must be committed to memory building on what was learned in the prerequisite course. Prerequisite: Successful Completion of Top 200 I Offered: Fall and Winter Restrictions: AU 52 Level B

7361 Pharmacology I (4). Study of the pharmacology of medicinals with emphasis on basic principles, the autonomic nervous system and drugs affecting the cardiovascular and renal systems. Four hours lecture per week. Prerequisites: LSPHys 400 and LSBIoc 366 Restrictions: AU 51 & AU 52 Level A

7362 Pharmacology II (5). The study of the pharmacology of medicinals with emphasis on drugs affecting the central nervous system, chemotherapy, anti-microbial agents, and drugs used to treat endocrine disorders. Five hours lecture per week. Prerequisite: PHARM 361 or permission of instructor. Winter. Restrictions: AU 51 & AU 52 Level A

7377 Principles Of Nutrition Support (2). This course will introduce the student to the fundamentals of nutrition support and prepare him/her for future involvement in this important practice area. It teaches practical skills, including assessment of the patient's nutritional status, estimation of calorie and protein requirements and how to recommend an appropriate formulation to meet these requirements. The student will learn indications for parenteral and enteral nutrition and how to select the most appropriate feeding. The student is taught how parenteral and enteral nutrition is safely administered, will learn the major complications, as well as methods to prevent or treat these problems. Topics covered include venous access, care of venous access devices, central vs. peripheral parenteral nutrition, fluid and electrolyte management, admixture compatibility and stability, and management of the nutrition support patient in various disease states. Restrictions: AU 52 Level A & B

7389 Advances In Drug Therapy (2). Study of the advances in drug delivery and therapy; the concepts of advanced and novel drug delivery systems, modern drug analysis tools, role of efflux protein in drug kinetics, and transporter/receptor mediated drug delivery. Prerequisites: Phar 303 Co-Requisite: Phar 420 Restrictions: AU 52 Level B Offered: Fall

7397 Home Health Care (2). Anything a patient does in the home concerning their healthcare is considered Home Health Care. All aspects of Home Health Care are covered in this class. Diabetic & Ostomy products & care, Durable Medical Equipment (Wheelchair, cane, crutches, etc.), home Renal Dialysis, Wound Care, Respiratory Therapy, IV accesses, Home Infusion Therapy, Hospice Care, and Enteral Nutrition are presented and discussed. Reimbursement issues are not discussed due to constantly changing regulations. This is a "hands on" class with participation in, for example, ostomy fitting, crutches fitting, enteral nutrition taste testing, and a tour of a Home Infusion Pharmacy. Prerequisite: Familiarity with IV Admixtures. Phar 362 & Phar 405 Offered: Fall Restrictions: AU 52 Level A & B Co-Requisite: Phar 420

7398 Comprehensive Diabetes Management (4). The purpose of the course is to provide the student with a multidisciplinary foundation in the principles of diabetes management. The student will develop their knowledge and ability to assess, manage, educate and monitor patients with diabetes. The faculty are comprised of a multidisciplinary team of experts for the online lecturers. The in class discussion will be lead by a faculty member who specializes in diabetes management. Prerequisites: Pathophysiology, Advanced Nursing 548, Pharmacology I, Pharmacy 361 Restrictions AU52 I Levels A,B,C

7399 Required Enrollment (1). Required enrollment for international students in pharmacy training sites.

7404P Drug Information Clerkship (4). The candidate will spend one month providing service in the Drug Information Center. Activities are designed to enhance the candidate's skills in retrieval and critical evaluation of the drug literature. Candidates will participate in answering drug information questions and preparation of documents for pharmacy and therapeutics committees and service contracts of the Drug Information Center. Required rotations.

7405 Pharmacotherapy I (3). Pharmacotherapy I integrates the fundamentals of pathophysiology and pharmacology to develop the student's ability to provide pharmaceutical care. The course promotes the development and application of problem-solving strategies in self-limiting illnesses. In general, two hours of lecture and two hours of small group discussion per week. Prerequisite: Nurs 548, Pharmacy- 325,361,414 Offered: Winter

7406P General Medicine I (4). The candidate will spend two semester in a medical service at an affiliate institution. Emphasis of study will be on the care of adults with commonly seen illnesses. Candidates will take part in cnat review conferences, rounds and consultations as directed by the supervising faculty. Successful completion of all coursework through semester 6. Restrictions AU 52 Level B, Prerequisites: Pharmacy 325 concurrent enrollment in Pharm 420 (Fall) and Pharm 485P (Winter) Offered: Fall/Winter

7407P General Medicine II (Ambulatory Care) (6). The candidate will spend one month in a patient-care service which is dedicated to the care of the ambulatory patient. Emphasis of study will be on pharmacotherapy in adult patients. Candidates are expected to become involved in the provision of primary care, medication maintenance activities and improvement of rationale drug therapy in the practice environment. Strong emphasis is placed on patient counseling and interviewing skills. Required rotation. Prerequisite: Successful completion of all coursework through semester 8. Restrictions: AU 52 Level C Offered: Fall/Winter

7409P Health Systems Clerkship (4). The candidate will spend one month assigned to a health system site. Emphasis of study will be on the organizational, technical and administrative aspects of providing comprehensive pharmaceutical services in a health system. Clinical responsibilities will be maintained throughout the rotation. Candidates will take part in department activities to enhance understanding of the integration of all aspects of pharmaceutical care within the department and other services in the facility (i.e. departmental planning, committee activities, drug distribution, staff supervision and quality assurance programs, formulary management.) Restrictions: AU 52 Level C Offered: Fall & Winter

7410P General Medicine III (4). Continuation of Required General Medicine series. Required rotation. Offered: Fall/Winter Restrictions: AU52 Level C

7412P Community Pharmacy Practice Clerkship (4). The candidate will spend one month assigned to a faculty member whose practice is based in a community setting. Emphasis of study will be on the organizational, technical and administrative aspects of providing comprehensive pharmaceutical services to patients in a community practice. Clinical responsibilities will be maintained throughout the rotation. Candidates will take part in all aspects of pharmaceutical care within the practice (i.e., distribution, counseling, provision of drug information, operations management and practice development). Required rotation. Offered: Fall & Winter Restrictions: AU 52 Level C

7414 Professional Skills Development II (3). Students will apply communication skills from prerequisite course work and develop new skills that allow them to provide pharmaceutical care to their patients. Emphasis of study includes: patient interviewing, profile review, counseling, ethical challenge in patient care, communication dilemmas and communicating with other health-care providers and patients with special needs. Additionally, students will be assessed on writing and presentation skills from a range of assignments. One 2 hour lecture and 1.5 hour small group discussion are held per week. Prerequisites: Pharm. 101 and ComS 110. Offered: Winter

7418P Elective Clerkship I (4). Elective experiences are an essential element to the candidates' training designed to develop areas of personal interest and to expand their understanding of professional opportunities. These rotations revolve around areas of basic science, clinical practice, research and administration. Candidates may repeat required rotations as electives or may approach faculty to tailor an elective experience to develop an area of interest. Required rotation. Prerequisites: Successful completion of all coursework through semester 8 Offered: Fall/Winter Restrictions: AU 52, Level C

7419P General Medicine IV (4). Continuation of General Medicine series. Required rotation. Prerequisites: Successful completion of all coursework through semester 8

7420 Health Assessment & Pharmacotherapy II (7). This course is designed to foster the student's ability to provide pharmaceutical care. Patient assessment is an integral part of the pharmaceutical care process. Students are expected to continue developing and applying problem-solving strategies to complex disease states commonly encountered in pharmacy practice. UP to seven hours of lecture and two hours of small group discussion can occur per week. Evaluation of skills necessary to assess patients will occur throughout the semester. Students are also expected to complete four examinations during the course. Prerequisite: Pharm 303, 405, 362 and Nurs 548. Concurrent enrollment in Pharm 406P required. Offered: Fall

7420P Elective Clerkship II (4). Elective experiences are an essential element to the candidates training designed to develop areas of personal interest and to expand their understanding of professional opportunities. These rotations revolve around areas of basic science, clinical practice, research and administration. Candidates may repeat required rotations as electives or may approach faculty to tailor an elective experience to develop an area of interest. Optional rotation.

7421P Elective Clerkship III (4). Elective experiences are an essential element to the candidates training designed to develop areas of personal interest and to expand their understanding of professional opportunities. These rotations revolve around areas of basic science, clinical practice, research and administration. Candidates may repeat required rotations as electives or may approach faculty to tailor an elective experience to develop an area of interest. Optional rotation.

7424 Introduction To Natural Product Therapeutics (2). The course is intended to provide students with an awareness of important issues about dietary supplements to consider when providing pharmaceutical care to patients. Students will learn communication skills specific to discussing supplement use with patients, basic clinical knowledge to avoid or minimize the risk of harm with common dietary supplements, and the skills to retrieve and interpret reliable information to be able to make decisions about new or unfamiliar supplements. Prerequisite: Fourth Prof Year CO-Req: Pharm 420 Restrictions: AU 52 Level B Offered: Fall

7427 Hospital Pharmacy (2). Methods utilized by hospitals to distribute medication, as well as the fiscal and administrative aspects of such systems. Students who enroll in this course are to spend at least one four-week portion of the Pharmacy Externship in a general hospital setting unless excused by instructor. Elective. Offered: Winter Restrictions: AU 52 Level B

7428 Veterinary Pharmacology (3). Pharmaceutical preparations used in veterinary medicine. Elective.

7449 Clinical Economics & Medical Decision-Making (3). This three-hour course is a critical review and evaluation of the economic analysis of medical decision-making. An emphasis will be placed on the critical evaluation of recent literature assessing medical decision-making through the use of such tools as cost-benefit analysis, cost-effectiveness analysis, cost-minimization, markov modeling, bayesian statistics. Prerequisite: Third Yr or Graduate Restrictions: Au 52 or AU 68 91 Level A & B only or instructor consent Offered: Fall

7451 Pharmacy Law And Ethics (2). Laws and ethics which affect the practice of pharmacy. Two hours lecture and/or discussion per week. Prerequisite: Completion of all required courses through Sem 6 Offered: Fall Restrictions: AU 52 Level B

7463 Toxicology (2). Fundamentals of toxicology, including discussion of the general classes of poisonous substances, their physiological effects, and methods of treatment. Prerequisite: Pharmacy 361 Offered: Winter Restrictions: AU 51 & AU 52 Level A

7465 Economics Of Health & Medicine (3). An economic analysis of the development of the medical market; organized medicine and the structure of existing health delivery systems. The problems of the medical market will be analyzed; the role of insurance will be investigated and alternative public policies will be studied. Prerequisites: Upper level or permission of instructor Restrictions: AU 52 Offered: Fall

7467 Religion, Culture And Health (3). This course addresses the impact of religious beliefs, education, and cultural practices on health and healthcare issues pertinent to various segments of our society. Restrictions: Instructor consent required. Offered: Fall

7485P Health Assessment & Pharmacotherapy III (7). This course is designed to foster the student's ability to provide pharmaceutical care. Patient assessment is an integral part of the pharmaceutical care process. Students are expected to continue developing and applying problem-solving strategies to complex disease states commonly encountered in pharmacy practice. UP to seven hours of lecture and two hours of small group discussion can occur per week. Evaluation of skills necessary to assess patients will occur throughout the semester. Students are also expected to complete four examinations during the course. Prerequisite: Pharm 420. Concurrent enrollment in Pharm 326 and Pharm 406P required. Offered: Winter

7489AB Special Topics In Pharmacy (1-5).

7489E Special Topics In Pharmacy (1-5). A course designed to deal with a topic which is not available in the regular course offerings. Topic, instructors and prerequisites to be listed in the term bulletin. Elective.

7489M Special Topics In Pharmacy (1-5). A course designed to deal with a topic which is not available in the regular course offerings. Topics, instructors and prerequisites to be listed in the term bulletin. Elective.

7489N Special Topics In Pharmacy (1-5). A course designed to deal with a topic which is not available in the regular course offerings. Topics, instructors and prerequisites to be listed in the term bulletin. Elective.

7489O Special Topics In Pharmacy (1-5). A course designed to deal with a topic which is not available in the regular course offerings. Topics, instructors and prerequisites to be listed in the term bulletin. Elective.

7489P Special Topics Pharmacy (1-5). A course designed to deal with a topic which is not available in the regular course offerings. Topics, instructors and prerequisites to be listed in the term bulletin. Elective.

7497E Directed Individual Study-Clinical Pharmacy (1-4). Study in areas of special interest under individual faculty direction. Credit/no credit. Written permission of instructor required. Elective. Not to exceed five semester credits. Offered: Each term. Prerequisite: Consent number required Restrictions: AU 52

5507 Basic Pharmacology (3). Basic pharmacological concepts and important classes of pharmacologic agents. Prerequisites: Human anatomy, physiology and biochemistry. Fall, each year.

5509 Basic Toxicology (3). Principles of general toxicology and toxicology of industrial and household chemicals, agricultural agents, social poisons, and selected therapeutic agents. Prerequisites: Human Anatomy, Physiology, Biochemistry and PHARM 507 or 519. Offered: Fall, each year.

5515 Drug Absorption, Distribution, Metabolism And Excretion (3). A course dealing with the absorption, physiologic distribution, metabolism and excretion of drugs and other organic compounds and factors which influence these events. Three hours lecture a week. Fall, odd year.

5519 Pharmacology I (4). Pharmacology of medicinals with emphasis on basic concepts, the autonomic nervous system, and cardiovascular agents. Four hours lecture per week. Prerequisite: Human anatomy, physiology and biochemistry. Offered: Fall.

5520 Pharmacology II (5). Pharmacology of medicinals with emphasis on chemotherapeutic agents, drugs acting on the renal system, and drugs for endocrine disorders. Four hours lecture per week. Prerequisite: PHARM. 519. Offered: Winter.

5521 Advanced Organic Medicinal Chemistry (3). Chemistry, physiochemical properties, mechanism of action and structure-activity relationships of organic drug molecules. Fall, odd years.

5527 Analytical Methods (3). A detailed study of the methods used to detect, identify, and quantitate drugs, small molecules, enzymes, proteins, and biological molecules. The statistical foundation, core concepts, and practical implementation of analytical methods are areas of emphasis. State-of-the-art instrumentation and recent technological developments are also presented,

including biotechnology based methods such as proteomics methods and quantitative PCR. Prerequisites: Two hours of lecture and three hour demonstration/laboratory a week. Offered: Fall

5531 Physical Pharmacy Equilibria (3). Advanced principles of aqueous solutions, acid-base equilibria, solubility and complexation. Mathematical solutions and state-of-the-art research applications. Three hours lecture a week. Prerequisite: B.S. in Pharmacy Permissions of instructor. Winter, even years.

5533 Biopharmaceutics And Pharmacokinetics (4). Study of (1) the kinetics of absorption, distribution, and elimination of drugs and the relationship of kinetic parameters to dosage form, biological factors, and dosage regimen; (2) the development of various models for pharmacodynamic-pharmacokinetic correlations. Four hours lecture. Prerequisite: MATH 345 (Ordinary Differential Equations) or equivalent. Fall, even years.

5550 Stability Of Pharmaceuticals (3). The course provides instruction in the processes responsible for instability of pharmaceuticals. Course content includes, but is not limited to, instability due to light, oxygen, and metal ions; the effect of temperature on the rate of drug decomposition; the effect of dielectric constant and ionic strength on degradation; and physical and chemical instability of newer polypeptide drugs. In addition, practical strategies to prevent instability of the active compound and excipients used in pharmaceutical formulations is provided. Prerequisites: MATH Calculus (required) & Ordinary Differential Equations (recommended); Course Grade of "B" or better in both PHAR 202 and 203; Restriction: Consent of instructor Offered: Fall semester even-numbered year.

5555 Religion, Culture And Health (3). This course addresses the impact of religious beliefs on the culture practices of contemporary society, and aims at examining the relationship between these beliefs, modern sciences and health. It will be offered to all students, in Fall semesters. No prerequisites. Offered: Every Fall

5580A Seminar In Pharmaceutical Sciences (1). Enrollment and participation required of all graduate students in the School of Pharmacy during each semester of graduate study. One hour each week. This course is graded on a credit/ no credit basis. Offered: Fall and winter.

5580C Seminar In Pharmacology/Toxicology (1). Enrollment and participation required of all graduate students in the School of Pharmacy during each semester of graduate study. Credit/no credit. One hour each week. Fall & winter.

5590A Special Topics Pharmacy (1-3).

5590B Special Topics Pharmaceutical Chemistry (1-3).

5599A Research And Thesis Pharmacy (1-9).

5599B Research And Thesis Pharmaceutical Chemistry (1-9).

5599C Research And Thesis Pharmacology (1-9).

5606 Biochemical Toxicology (3). Recent advances in organ-specific toxicity and the mechanisms of toxicity of drugs and environmental chemicals. Prerequisite: Consent of instructor. Winter, odd years.

5615 Methods In Pharmacology And Toxicology (3). Exposure to some of the techniques employed in research in pharmacology and toxicology. One hour conference and six hours laboratory per week. Prerequisite: Permission of instructor.

5616 Molecular Toxicology (3). Study of the molecular mechanisms of toxicity with emphasis on receptor theory and quantitative structure activity relationships. Three hours lecture or discussion a week. Prerequisites: PHARM 510 and 515 or permission of instructor. Winter, even years.*

5625 Synthetic Medicinal Chemistry (3). Medicinal chemicals are considered as to their synthesis and structure-activity requirements as well as to current research and technology in the area. Offered on demand.*

5631 Pharmaceutical Formulations I (3). Advanced theory and practice of Pharmaceutical formulations including classical and current research. This course will introduce the principles of biomaterial based drug delivery systems and unify knowledge from the fields of biology, materials science, and pharmaceuticals. Prerequisites: B.S in Pharmacy. Offered: Fall, odd years.*

5632 Novel Drug Delivery Systems (3). The course offers up-to-date information about drug transport mechanisms and drug absorption processes across various absorptive membranes ie., buccal, nasal, dermal, corneal, pulmonary, and oral mucosae. The course material has been designed to provide current ideas and thinking about gene delivery, drug targeting to tumor cells and lipid and carrier mediated drug delivery. It provides unique information about cell culture models as a predictor of drug delivery as well as physical chemistry of surfaces in various microparticulates and lipid emulsion systems.

5633 Receptor Pharmacology And Signal Transduction (3). Molecular characterization of drug receptors involving quantitative description of functional studies with agonists and antagonists and binding of ligands to receptors; the molecular structure of receptors and the signaling systems that couple receptors to their pharmacological functions. Prerequisites: Biochemistry

561/562 and/or Pharmacology 519/ 520. Offered: Every other Winter Other: When we have enough students willing to take course on demand.

5645 Cancer Biotechnology I (3). This course is designed to provide a basic understanding of tumor progression, molecular events and signaling mechanisms underlying tumor formation. Epidemiological approaches, etiology, and current methods of detection and diagnosis of cancer will be discussed. Current pharmacological management strategies of cancer and future therapeutic interventions will also be reviewed. Prerequisite: BIOL 202 or equivalent. Fall, even years.

5646 Cancer Biotechnology (3). Cancer Biotechnology II will focus on gene regulation of cancer cells with specific pharmaceutical agents. The course will target chemotherapeutic agents and examine current technology in gene therapy. Antisense and ribozyme DNA will also be discussed. Prerequisites: Phar 645 and Cancer Biotechnology I. Winter, odd years.

5690B Special Topics Pharmaceutical Chemistry (1-3).

5690BB Special Topics Toxicology (1-3).

5690C Special Topics Pharmacology (1-3).

5699A Research And Dissertation - Pharmacy (1-16).

5699B Research And Dissertation Pharmaceutical Chemistry (1-16).

5699BB Research And Dissertation Toxicology (1-16).

5699C Research And Dissertation Pharmacology (1-16).

5899 Required Graduate Enrollment (1).