

College of Pharmacy

Christopher Owens, Pharm.D., M.P.H., Interim Dean

Jennifer L. Adams, Pharm.D., Clinical Associate Professor, Associate Dean for Academic Affairs

Brooke Garrett, Pharm.D., Clinical Associate Professor, Associate Dean for Student Affairs

Department of Biomedical and Pharmaceutical Sciences

Chair and Professor: Marvin Schulte

Professors: Robin Dodson, James Lai

Assistant Professors: Prahba Awale, Jared Barrott, Ali Habashi, Rob Myers, Srinath Pashikanti, Dong Xu

Allied Graduate Faculty: Dennis Stevens (Boise VA), Amy Bryant (Boise VA), Michael Aldape (Boise VA), Ken Cornell (BSU, Associate Professor)

Department of Pharmacy Practice and Administrative Sciences

Interim Chair and Professor: Oliphant

Professors: Culbertson, Force, Hachey, Lott, Madaras-Kelly, Mason, Rhodes

Associate Professors: Cleveland, Liday, Owens

Clinical Associate Professor: Adams, Hefflinger, Pettinger, Garrett

Clinical Assistant Professors: Biddle, Carr, Casperson, Eroschenko, Ratliff, Steed-Ivie, Wadsworth

Emeritus: Adamcik, Cashmore, Erramouspe, Galizia, Gould, Hurley, Jue, Sharp

Degree Programs

The College of Pharmacy offers two graduate degrees: the Master of Science (M.S.) in Pharmaceutical Sciences and the Doctor of Philosophy (Ph.D.) in Pharmaceutical Sciences. The College also offers a professional doctorate degree, Doctor of Pharmacy (Pharm.D.). The Pharm.D. is described in the College of Pharmacy (<http://coursecat.isu.edu/undergraduate/divisionhealth/pharmacy/#text>) section of the Idaho State University Undergraduate Catalog.

Goals

To train and prepare students to succeed in their chosen career path in the variety of areas in pharmaceutical sciences.

Objectives

- To rigorously train students in the department focus areas;
- To train students to be effective communicators of their knowledge and scientific findings;
- To expose students to multidisciplinary approaches to problem-solving so that they can use them to solve scientific problems;
- To educate students to be competent practitioners of the scientific method;
- To expose students to a variety of professional strategies so that, upon finishing their training, they become adaptable and successful in achieving their long-range goals.

Doctor of Philosophy

Programs of study leading to the Doctor of Philosophy (Ph.D.) degree are offered through the Department of Biomedical and Pharmaceutical Sciences (emphasis areas of Pharmaceutics, Drug Discovery, or Pharmacology) and through the Department of Pharmacy Practice and Administrative Sciences (emphasis in Pharmacoeconomics and Administrative Sciences). The Ph.D. degree is a research degree and will be conferred upon the completion and report of a substantial body of original work.

General Admission Requirements

The student must apply to, and meet all criteria for, admission to the Graduate School. In addition to the general requirements of the Graduate School, the student must comply with the following:

1. Professional degree in pharmacy or a baccalaureate degree in a related field (i.e. biology, chemistry, psychology).
2. GPA of not less than 3.0 for all upper division courses (final two years).
3. Official report of Graduate Record Examination Scores with a minimum combined score of 300 is required on the verbal and quantitative sections and at least 50th percentile in one of the GRE sections (verbal, quantitative, or Analytical).
4. Applicants must have a demonstrated proficiency in the English language. Students from countries where English is not the first language must demonstrate proficiency in the English language with a minimum score of 79 (internet#based test) on the Test of English as a Foreign Language (TOEFL) OR an overall band of 6.5 on the Academic Examination of the International English Language Testing System (IELTS).
5. Three letters of recommendation from individuals familiar with the applicant's academic ability and potential for graduate study.
6. Applicants must provide a personal statement of interest describing their career goals and identify which area of emphasis in the graduate program the applicant intends to follow and members of the department faculty with whom the applicant would prefer to complete his/her degree. Applications without a personal statement following these guidelines will be rejected.

Meeting minimum requirements does not guarantee admission. Other factors such as research publications, other evidence of scholarly work, strong recommendations by department graduate faculty, or compatibility of the applicant's career goals with department programs may influence the Admissions Committee to recommend conditional acceptance in the event that minimum qualifications have not been met.

General Requirements

Each beginning graduate student will have a graduate advisor assigned from the graduate faculty upon entry into the program. The student's advisor will assist the student in preparing an appropriate program of study of course work. While there is no fixed credit requirement for the Ph.D. in Pharmaceutical Sciences, the overall program of study will include at least 72 semester hours of graduate course work. The student is expected to have selected a major advisor from the graduate faculty no later than the end of his/her second semester in residence.

A grade below B is unsatisfactory and will not be counted toward fulfilling the minimum requirements for the degree. Upon recommendation of the student's advisor, and with the approval of the Graduate Program Director, a student may

be required to withdraw at any time for failure to maintain satisfactory progress toward the degree.

When course work is essentially complete, candidates for the Ph.D. degree complete a series of written and oral comprehensive examinations that includes the defense of a written research proposal. Upon completion of all proposed research, the student's findings will be reported in the form of a dissertation to be prepared in accordance with Department and Graduate School guidelines. While the dissertation must be defended to the graduate faculty of the College, acceptability only requires the affirmative vote of a majority of the student's committee members.

Doctor of Philosophy in Pharmaceutical Sciences (Drug Discovery, Pharmaceutics, or Pharmacology Emphasis)

Admission Requirements

See General Admission Requirements above. Applications for the graduate program in Pharmaceutical Sciences are reviewed twice yearly near the end of the fall and spring semesters. Deadline for the receipt of applications is April 1 for admission in the fall semester, and October 1 for admission in the spring semester. Incomplete applications and applications received after these deadlines will not be considered.

International students should also refer to the "Admission of International Students" section of the Graduate Catalog. Students with international coursework to be considered with their applications must submit an official detailed evaluation report from an institution that is a member of the National Association of Credential Services Incorporated (NACSI).

Course Requirements

Code	Title	Credits
PSCI 5508	Responsible Conduct in Research	1
PSCI 6601	Graduate Seminar (4 credits minimum) ¹	1
PSCI 6602	Research Design and Analysis for Pharmaceutical Sciences	3
PSCI 6605	Critical Literature Evaluation (6 credits minimum) ¹	1
PSCI 6698	Dissertation Research (18 credits minimum) ²	1-10
PSCI 8850	Dissertation (minimum credits) ²	1-2
Electives in Pharmaceutical Sciences		9
Biomedical and Pharmaceutical Sciences related courses (as determined by committee)		17

¹ Repeatable course.

² Minimum 20 credits required between Dissertation Research and Dissertation.

A minimum of 72 credits including a minimum of 20 credit hours in dissertation research (PSCI 6698) and dissertation (PSCI 8850) are required. For all degree candidates, at least one half of total graduate credit hours required by the student's Graduate Program Committee must be 6600 level. Minimum graduate credit requirements usually do not fulfill Departmental degree requirements. Specific details are provided in the Department of Pharmaceutical Sciences Graduate Guidelines.

All students in the graduate program, whether seeking the Doctor of Philosophy or the Master of Science, are expected to demonstrate proficiency in written and

spoken English. Students may be required to successfully complete classes in speech and in technical writing at the request of the graduate program director and the graduate faculty of the Department of Biomedical and Pharmaceutical Sciences.

Doctor of Philosophy in Pharmaceutical Sciences (Pharmacoeconomics and Administrative Sciences Emphasis)

Course Requirements

Code	Title	Credits
Statistics and Research Methods		
BIOL 6605	Biometry	4
Statistics and Research Methods		4
PADM 6605	Research Methods in Pharmacy Administration	3
SOC 5508	Statistical Analysis	3
or PSYC 6632	Statistics and Research Design II	
Pharmacy Administration Major Courses		
PADM 6601	Graduate Seminar in Pharmacy Administration (4 credits minimum)	1
PADM 6610	Social and Behavioral Aspects of Pharmacy Practice	3
PADM 6632	Medical Economics	3
PADM 6634	Advanced Pharmacy Administration I	3
PADM 6635	Advanced Pharmacy Administration II	3
Major area elective courses		12
Minor Area Courses (12 courses) ¹		
Minor area elective courses		12
Research Activities (19 credits minimum)²		
PADM 6650	Thesis Research ²	3
PSCI 6698	Dissertation Research (18 credits minimum)	1-10
PSCI 8850	Dissertation	1

¹ A student entering the Ph.D. program with an M.S. degree in a related area may petition the Advisory Committee to waive the elective 12 credits required in a minor area of study.

² All students must have research experience prior to beginning the dissertation. If a student has not completed an M.S. thesis, then s/he must complete a minimum of 3 credits of graduate research (PADM 6650) and complete a research project resulting in a paper of publishable quality. If a student has completed an M.S. thesis, s/he may petition the Advisory Committee to accept it as fulfillment of this requirement.

Master of Science

The M.S. program offers the student a choice of four emphasis areas: Drug Discovery, Pharmaceutics, Pharmacology, and Pharmacoeconomics and Administrative Sciences.

General Admission Requirements

The student must apply to, and meet all criteria for, admission to the Graduate School. In addition to the general requirements of the Graduate School, the student must comply with the following:

1. Professional degree in pharmacy or a baccalaureate degree in a related field (i.e. biology, chemistry, psychology).
2. GPA of not less than 3.0 for all upper division courses (final two years). (Students with a grade point average between 2.75 and 3.0 will receive consideration for admission on a Classified (w/PR) basis.)
3. Official report of Graduate Record Examination Scores with a minimum combined score of 300 is required on the verbal and quantitative sections and at least 50th percentile in one of the GRE sections (verbal, quantitative, or Analytical).
4. Applicants must have a demonstrated proficiency in the English language. Students from countries where English is not the first language must demonstrate proficiency in the English language with a minimum score of 79 (internet#based test) on the Test of English as a Foreign Language (TOEFL) OR an overall band of 6.5 on the Academic Examination of the International English Language Testing System (IELTS).
5. Three letters of recommendation from individuals familiar with the applicant's academic ability and potential for graduate study.
6. Applicants must provide a personal statement of interest describing their career goals and identify which area of emphasis in the graduate program the applicant intends to follow and members of the department faculty with whom the applicant would prefer to complete his/her degree. Applications without a personal statement following these guidelines will be rejected.

Meeting minimum requirements does not guarantee admission. Other factors such as research publications, other evidence of scholarly work, strong recommendations by department graduate faculty, or compatibility of the applicant's career goals with department programs may influence the Admissions Committee to recommend conditional acceptance in the event that minimum qualifications have not been met.

General Requirements

All classified graduate students must register for the appropriate graduate seminar (PSCI 6601) each semester in which they are registered for graduate credit. A minimum of two credits in graduate seminar (PSCI 6601) is required for the degree.

Master of Science in Pharmaceutical Sciences (Drug Discovery, Pharmaceutics, or Pharmacology Emphasis)

Admission Requirements

See General Admission Requirements above. Applications for the graduate program in Pharmaceutical Sciences are reviewed twice yearly near the end of the fall and spring semesters. Deadline for the receipt of applications is April 1 for admission in the fall semester, and October 1 for admission in the spring semester. Incomplete applications and applications received after these deadlines will not be considered.

International students should also refer to the "Admission of International Students" section of the Graduate Catalog. Students with international coursework to be considered with their applications must submit an official detailed evaluation report from an institution that is a member of the National Association of Credential Services Incorporated (NACSI).

All M.S. degrees in the Pharmaceutical Sciences graduate program are thesis-based and require the completion of an original research project.

Course Requirements

A minimum of 33 credits, including at least 6 credit hours in thesis research (PSCI 6650), is required by the Graduate School. For all degree applicants, at

least one half of total graduate credit hours required by the student's Graduate Program Committee must be at the 6600-level. Minimum Graduate School credit requirements may not fulfill Departmental degree requirements.

All students in the graduate program, whether seeking the Doctor of Philosophy or the Master of Science, are expected to demonstrate proficiency in written and spoken English. Students may be required to successfully complete classes in speech and in technical writing at the request of the graduate program director and the graduate faculty of the Department of Pharmaceutical Sciences.

Code	Title	Credits
PSCI 5508	Respon Conduct in Research	1
PSCI 6601	Graduate Seminar (2 credits minimum) ¹	1
PSCI 6602	Research Design and Analysis for Pharmaceutical Sciences	3
PSCI 6605	Critical Literature Evaluation (3 credits minimum) ¹	1
PSCI 6650	Thesis Research (minimum credits)	6
Electives in Pharmaceutical Sciences		6
Biomedical and Pharmaceutical Sciences related courses (as determined by committee)		12

¹ Repeatable course.

Master of Science in Pharmaceutical Sciences (Pharmacoeconomics and Administrative Sciences Emphasis)

See General Admission Requirements above. Applications for the graduate program in Pharmaceutical Sciences are reviewed twice yearly near the end of the fall and spring semesters. Deadline for the receipt of applications is April 1 for admission in the fall semester, and October 1 for admission in the spring semester. Incomplete applications and applications received after these deadlines will not be considered.

International students should also refer to the "Admission of International Students" section of the Graduate Catalog. Students with international coursework to be considered with their applications must submit an official detailed evaluation report from an institution that is a member of the National Association of Credential Services Incorporated (NACSI).

All M.S. degrees in the Pharmaceutical Sciences graduate program are thesis-based and require the completion of an original research project.

Course Requirements

Code	Title	Credits
Statistics and Research Methods		
BIOL 6605	Biometry	4
PADM 6605	Research Methods in Pharmacy Administration	3
Pharmacy Administration Major Courses		
PADM 6601	Graduate Seminar in Pharmacy Administration (2)	1
PADM 6610	Social and Behavioral Aspects of Pharmacy Practice	3
or PADM 6632	Medical Economics	
PADM 6634	Advanced Pharmacy Administration I	3
or PADM 6635	Advanced Pharmacy Administration II	

Major area electives	12
Research Activity	
PADM 6650	Thesis Research 6

Master of Science in Psychopharmacology

General Requirements

The graduate curriculum is 24 months in length and is divided into two academic years, including some course work and supervised practical experiences during summer semesters. Generally, each class of students will progress through the curriculum as a cohort, although a non-traditional, part-time route is also available for current practitioners. If a non-traditional route is desired, students should contact the program-training director to determine an appropriate schedule to complete requirements, keeping in mind prerequisite and co-requisites.

The didactic curriculum is comprised of foundational courses in pharmacology and physical assessment in the first year, followed by integrated psychopharmacotherapeutic courses in the second year. Topics in law, research and writing, and practice management are also included. Supervised clinical experiences will be required in both years of the curriculum to ensure adequate and appropriately timed patient care activities and supervised prescribing of psychotropic medications in according with Idaho State Law requirements. Courses in pathophysiology and clinical assessment are offered by the College of Nursing and one course in research writing is offered through the Department of Community and Public Health. Some courses may have laboratory or practicum hour requirements.

A complete list of professional/technical standards covering essential capacities for observation, communication, sensory and motor function, behavioral and social attributes, and other student performance requirements is available from the program.

Course Sequence

First Year

Fall	Credits	Spring	Credits	Summer	Credits
RXPP 5543	3	NURS 6611 & 6611L	6	RXPP 6603	1
NURS 6620	3	PSCI 6612	3		
RXPP 5544	3	PSCI 6613	3		
RXPP 6602	1				
	10		12		1

Second Year

Fall	Credits	Spring	Credits	Summer	Credits
RXPP 6604	3	MPH 6640	3	RXPP 6610	1
RXPP 6605	3	RXPP 6607	3		
RXPP 6606	3	RXPP 6608	3		
	9		9		1

Total Credits: 42

Dual Pharm.D./Graduate Degree Programs

Joint Pharm. D./M.S. in Pharmaceutical Sciences or Pharm.D./Ph.D. in Pharmaceutical Sciences (Drug Discovery, Pharmaceutics, or Pharmacology Emphasis)

Objective

The objective of the dual degree program at Idaho State University College of Pharmacy is to train qualified biomedical and pharmaceutical scientists for academic, industry, or government positions in the relevant scientific field.

This program is intended for highly qualified applicants and is designed to reduce the total time needed for completion of the two degrees while maintaining the high standards of the individual programs. It is intended to increase the number of highly trained clinician-researchers that can operate at the interface of basic research and clinical care to facilitate a more rapid translation of medical innovation into benefit for the patient.

Admission Requirements

- Applicants must first be admitted to the PharmD program at Idaho State University's College of Pharmacy. For admission criteria and process see <http://pharmacy.isu.edu/live/pharmd/admissions.html>
- Applicants must hold a B.S. or a B.A. degree in one of the sciences, or must have completed three years of education at a college or university which will grant a B.S. or B.A. after completion of one year of education at ISU College of Pharmacy.
 - Preference will be given to applicants who have completed one year of physical chemistry and one year of calculus.
 - Additional courses in biochemistry, human anatomy, analytical chemistry, microbiology, advanced mathematics, and advanced organic chemistry are desirable but not required.
- Applicants must meet all of the graduate student admission requirements as outlined above, including:
 - Minimum GPA of 3.0 on a 4.0 scale (or equivalent).
 - Minimum Graduate Record Examination combined score of 1,000 (old scale) or 300 (new scale) is required on the verbal and quantitative sections and at least 50th percentile in one of the GRE sections (verbal, quantitative, or Analytical).
 - Prior research experience, although not required, is strongly encouraged.

Application Process

- Applicants interested in the dual-degree program must arrange a meeting with the Graduate Program Coordinator. Individuals applying to the PharmD/PhD program prior to matriculating to the PharmD program should schedule the meeting at the time of their interview for the PharmD program.
- Students may be based at either the Pocatello or Meridian campus, depending on their research interests and the requirements of the graduate program.
- An applicant must first be admitted to the PharmD program at the ISU College of Pharmacy. After receiving confirmation of admission, the applicant should contact the Graduate Program Coordinator, who will provide an Application for Admission to the PharmD/PhD Program Form (PSCI-10)
- The application receipt deadline is April 1st. Applications should include:

- a. A completed application form.
- b. A personal statement explaining why the applicant wants to pursue the PharmD/PhD dual degree program.
- c. A description of previous research experience, including a letter from a previous research advisor if available.
- d. GRE scores
- e. Note – *Application materials already submitted for the PharmD application do not need to be resubmitted.*

5. Each applicant will be interviewed individually by the Graduate Program Coordinator.

6. The Graduate Program Coordinator and GEFRAC will review the application and make a recommendation for admission to the Department Chair and Dean.

7. Applicants will be notified by May 1st on the success of their application.

8. The application provides the student an opportunity to express interest(s) in specific research areas. This information will be utilized by the Graduate Program Coordinator to tailor the student's research experience(s) during the summer preceding the 1st year of pharmacy school (if applicable). Typically, the student will have three (3) different research experiences (rotations) lasting 3-4 weeks each. The total length for the summer research experience is ten (10) weeks. Students who need to complete PharmD pre-requisites during the summer prior to their 1st professional year are required to inform the Graduate Program Coordinator as early as possible to discuss summer rotation scheduling modifications.

9. Students enrolled in any later year of the PharmD program at ISU College of Pharmacy may also apply for admission to the PharmD/PhD program using the outlined process and timelines.

Program Requirements

For general information on the dual-degree program requirements including programs of study, research and teaching requirements, and financial support contact the College of Pharmacy Graduate Program Coordinator at gradinfo@pharmacy.isu.edu.

Joint Pharm.D.-Graduate Degree Program (Pharmacoeconomics and Administrative Sciences Emphasis)

Applicants must complete the following courses while enrolled in the P3 and P4 years of the Pharm.D. curriculum. (The courses listed below substitute for PSCI 5532 Clinical Research Design and Analysis, and 6 credits of professional electives required in the Pharm.D. curriculum). In addition, the following courses taken in the P3 year will constitute a minor area in Clinical Pharmacy as required in the graduate program: PPRA 5534 and PPRA 5535 Therapeutics I and II, PSCI 5529 Clinical Pharmacokinetics, PSCI 5568 Toxicology; PPRA 5569 will substitute for 3 credits of PADM 6650 Thesis Research.

Code	Title	Credits
Third Professional Year Course Substitutions		
BIOL 6605	Biometry	4
PADM 6605	Research Methods in Pharmacy Administration	3
Pharmacy Administration major area graduate course		
Fourth Professional Year Elective Clerkship		
PPRA 5569	Research Specialty Clerkship	4

Additional Graduate Program Requirements

M.S. (thesis option)		
PADM 6601	Graduate Seminar in Pharmacy Administration (2 credits minimum)	1
Major area courses		
PADM 6650	Thesis Research	3
Ph.D.		
PADM 6601	Graduate Seminar in Pharmacy Administration (4 credits minimum)	1
Multivariate Analysis		
Research Methods Elective		
Major area courses		
PSCI 6698	Dissertation Research (18 credits minimum)	1-10
PSCI 8850	Dissertation	1

BioMed and Pharmacy Sci Courses

PSCI 5508 Respons Conduct in Research: 1 semester hour.

This course consists of the study of the ethical principles and related federal and state laws that govern scientific research. Through a combination of lecture and case study discussion, students will learn both the substance and application to scientific research of ethical principles and related laws. Topics addressed include conflict of interest, human subject research, live vertebrate animal subjects in research, safe laboratory practices, mentor/mentee responsibilities and relationships, collaborative research, peer review, data acquisition and laboratory tools (management, sharing, and ownership), research misconduct and procedures for handling misconduct, responsible authorship and publication, and contemporary ethical issues in biomedical research.

PSCI 5599 Experimental Course: 1-6 semester hours.

This is an experimental course. The course title and number of credits are noted by course section and announced in the class schedule by the scheduling department. Experimental courses may be offered no more than three times. May be repeated.

PSCI 6601 Graduate Seminar: 1 semester hour.

Discussion of current research and theories in Pharmaceutical Sciences. May be repeated.

PSCI 6602 Research Design and Analysis for Pharmaceutical Sciences: 3 semester hours.

Principles of research design and statistical analysis applicable to the pharmaceutical or biomedical sciences. Emphasis on evaluation of biomedical literature and on development of research plans. PREREQ: Permission of instructor.

PSCI 6603 Scientific Communication: 2 semester hours.

This course will survey basic techniques in scientific communication including: scientific manuscripts/articles, theses/dissertation, and other forms of written scientific communication; laboratory notebooks, reports and other technical documentation; collecting and citing literature; basic grantsmanship and introduction to the NIH grant submission process; scientific poster and podium (oral communication) formats; preparation of professional scientific materials including CV/resume, research summary, research philosophy, teaching philosophy; and the use of relevant software.

PSCI 6604 Research Practicum: 3 semester hours.

The student will receive practical laboratory training in pharmaceutical sciences under the guidance of faculty. May be repeated. PREREQ: Enrollment in the non-thesis option and permission of the instructor. Graded S/U.

PSCI 6605 Critical Literature Evaluation: 1 semester hour.

Offered each semester, this course involves the discussion and critical analysis of the current scientific literature, focusing in the pharmaceutical sciences and its related disciplines, with written and oral presentations by the students facilitated by rotating faculty. May be repeated.

PSCI 6606 Selected Techniques in the Laboratory: 2 semester hours.

Practical experience in the use of instrumentation and techniques in the student's area of specialization. Each student shall select three faculty laboratories in the Pharmaceutical Sciences for specific technical training. PREREQ: Permission of instructor.

PSCI 6607 Research Foundations: 3 semester hours.

A discussion of the nature and critical analysis of experimentation, principles of the scientific method, and literature in the Pharmaceutical Sciences.

PSCI 6609 Advanced Drug Delivery: 3 semester hours.

Critical assessment of novel drug carrier systems regarding biological, drug-related, and carrier-related factors. Study of targeted drug delivery and controlled release devices with emphasis on bioerodible polymers, matrix and reservoir systems.

PSCI 6610 Analytical Techniques in Pharmaceutics and Drug Delivery: 3 semester hours.

Theory and practice of analytical techniques in pharmaceutics and drug delivery research. PREREQ: Permission of instructor.

PSCI 6611 Current Topics in Pharmaceutics and Drug Delivery: 1 semester hour.

Discussion of current research topics in pharmaceutics and drug delivery. PREREQ: Permission of Instructor.

PSCI 6612 Basic Clinical Pharmacology: 3 semester hours.

This course is an introduction to pharmacologic principles and mechanism of drug action. Overviews on pharmacokinetics, pharmacodynamics, metabolism, receptor theory, and major medication classes will be covered.

PSCI 6613 Clinical Neuropharmacology: 3 semester hours.

Expanding on foundational knowledge, this course has added emphasis on neuropharmacology. It includes an in-depth study of neurotransmitter systems and psychotropic medications, while preparing the student to understand treatment of mental disorders with psychopharmacology. COREQ: PSCI 6612

PSCI 6618 Principles of Pharmacology I: 4 semester hours.

This course, the first of a two-part series, is designed to teach students the essential principles of pharmacology as a foundation for more advanced courses. Topics covered include cell biology, PK/PD, drug-receptor interactions, pharmacogenetics-epigenetics, and drug metabolism. Students will also be introduced to the molecular pharmacology of biological drug target classes, including enzymes, membrane receptors, ion channels, transport proteins, and transcription factors.

PSCI 6619 Principles of Pharmacology II: 4 semester hours.

This course, the second of a two-part series, is designed to teach students the essential principles of pharmacology as a foundation for more advanced courses. This semester focuses on the pharmacology of the major drug classes, including drugs affecting neurotransmission, cardiovascular and pulmonary function, immunomodulation, gastrointestinal function, hormones and hormone antagonists, and drug used for chemotherapy of microbial and neoplastic diseases. PREREQ: PSCI 6618.

PSCI 6620 Principles of Drug Design and Drug Action: 3 semester hours.

This course will survey the principles of drug discovery, drug design, and drug action including compound screening, hit identification, lead optimization, and theories of drug-receptor binding, focusing on small-molecule drug discovery. Fundamentals of enzyme kinetics and assay development will be reviewed as well as an introduction to rational drug discovery techniques. Special topics in prodrug and peptide drug design, inorganic medicinal chemistry, design of DNA active therapeutics, drug metabolism, and natural products drug discovery will be discussed. Drug discovery case studies will highlight and reinforce the concepts and theories covered. PREREQ: Permission of instructor.

PSCI 6622 Principles of Toxicology: 3 semester hours.

Introduction to basic concepts of toxicology, including mutagenesis, carcinogenesis, teratology, risk assessment, regulatory toxicology, toxicology of solvents, pesticides, metals and radioactive materials and design of toxicological studies. PREREQ: PSCI 6621 or permission of instructor.

PSCI 6630 Psychopharmacology: 3 semester hours.

This course will cover the mechanisms of action of psychoactive drugs, including drugs used in the treatment of psychopathological disorders and drugs of abuse. Also covered will be the learned basis of drug effects. Students will critique contemporary readings in the application of psychotherapeutic agents and processes of addiction. PREREQ: Permission of instructor.

PSCI 6631 Cancer Biology: 3 semester hours.

Study of the difference between normal and cancerous cells growth control, cell cycle, carcinogenesis, growth factor and oncogenes, cellular signaling, angiogenesis, telomerases, tumor invasion and metastasis, vitamins, diet and tobacco. PREREQ: Permission of instructor.

PSCI 6632 Anti-Cancer Drugs: 3 semester hours.

Cell cycle drug design and development, mechanisms of antimetabolites, alkylating agents, topoisomerase inhibitors, natural compounds, hormones and novel agents. Relationship between receptors and response to chemotherapy, drug resistance, drug delivery. PREREQ: Permission of instructor.

PSCI 6633 Experimental Oncology: 2 semester hours.

Cell culture, anti-cancer drug screening, protein, RNA and DNA analysis, methods in signal transduction and oncogene expression. Immunohistology, cell cycle analysis, receptor binding, receptor screening of tumors. Laboratory work included. Limit 5 students.

PSCI 6634 Current Topics in Oncology: 1 semester hour.

Study of current topics in cancer research. Emphasis on novel approaches to understand and treat cancer. PREREQ: Permission of instructor.

PSCI 6635 Special Topics in Oncology: 2 semester hours.

An introduction to cancer biology and cancer terminology. An overview of fundamentals of pharmacology as applied to cancer therapy. Mechanisms of action and resistance to chemotherapeutic drugs will be emphasized. A discussion of the importance of early detection. PREREQ: Permission of instructor.

PSCI 6636 Concepts and Tools in Pharmacogenomics: 2 semester hours.

The role of genetic factors in the development and evaluation of drugs, basic principles of microarray analysis introduction to proteomics. PREREQ: Permission of instructor.

PSCI 6640 Elements of Nanoscience and Nanotechnology: 3 semester hours.

An introduction to the properties of nanomaterials. Applications of nanomaterials in biomedical, pharmaceutical, environmental, and bioengineering systems and their impact on society. PREREQ: Permission of instructor.

PSCI 6650 Thesis Research: 1-10 semester hours.

1-10 Credits. May be repeated. Graded S/U

PSCI 6652 Advanced Biopharmaceutics and Pharmacokinetics: 3 semester hours.

Physicochemical principles involved in the kinetics of drug absorption, distribution, biotransformation, elimination, and therapeutic response. PREREQ: Permission of instructor.

PSCI 6653 Principles of Biopharmaceutical Analysis: 3 semester hours.

A treatment of the principles of modern methods for the qualitative and quantitative determination of drugs in biological materials.

PSCI 6655 Advanced Biopharmaceutical Analysis: 3 semester hours.

A continuation of PSCI 6653, this course covers the chromatographic techniques of analysis in detail including liquid chromatography, gas chromatography, thin layer capillary zone electrophoresis, and mass spectrometry, chromatography.

PSCI 6658 Biophys Chem and Struct Biol: 3 semester hours.

This course will explore the fundamentals of macromolecular structural biology, with an emphasis on the underlying principles of the related biophysical techniques, including x-ray crystallography, NMR, and mass spectrometry. Additional techniques related to the study of biological structure and function, including ultracentrifugation, absorption spectroscopy, and chromatographic methods will also be reviewed. PREREQ: Permission of instructor.

PSCI 6660 Molecular Pharmacology: 3 semester hours.

Advanced study in the transduction of biological signals, molecular basis for the action of hormones, neurotransmitters and growth factors on neurotransmission, metabolism, gene regulation and cell growth. PREREQ: PSCI 5567 and permission of instructor.

PSCI 6661 Drug Metabolism: 3 semester hours.

Advanced study in drug metabolism, cytochrome P450 oxidative system, toxic actions of drugs, mutagenicity, carcinogenicity, and in vitro systems for the study of metabolism. PREREQ: Permission of instructor.

PSCI 6662 Neuropharmacology: 3 semester hours.

The molecular basis of drug action in the central nervous system including nerve excitation, molecular properties of ion channels, neuropharmacological methods, pharmacology of ethanol and the mechanisms in tolerance and physical dependence. PREREQ: Permission of instructor.

PSCI 6670 Computer-Aided Drug Design I: 3 semester hours.

This course, the first of a two-part series, is designed to teach students the essential elements of computer-aided drug design. It will cover principles and applications of molecular modeling, an introduction to computational quantum mechanics, energy minimizations and methods of conformational analysis, computational simulations of biophysical systems (molecular dynamics and Monte Carlo methods), protein and DNA modeling, virtual screening, and structure-based hit and lead identification methods. PREREQ: Permission of instructor.

PSCI 6671 Computer-Aided Drug Design II: 3 semester hours.

This course, the second of a two-part series, is designed to teach students the essential elements of computer-aided drug design. It will cover principles and applications of cheminformatics, pharmacophore modeling in drug design, quantitative structure-activity relationship modeling, ADMET modeling, and ligand-based drug design techniques in hit identification and lead optimization. PREREQ: PSCI 6670 or permission of instructor.

PSCI 6682 Independent Problems in Pharmaceutical Sciences: 1-4 semester hours.

Advanced students are assigned special studies in areas of pharmaceutical sciences on the basis of interest and previous preparation. May be repeated. PREREQ: Permission of instructor.

PSCI 6698 Dissertation Research: 1-10 semester hours.

Research toward completion of the dissertation in the pharmaceutical, social, behavioral or administrative pharmacy sciences. May be repeated. Graded S/U.

PSCI 6699 Experimental Course: 1-6 semester hours.

This is an experimental course. The course title and number of credits are noted by course section and announced in the class schedule by the scheduling department. Experimental courses may be offered no more than three times. May be repeated.

PSCI 8850 Dissertation: 1-10 semester hours.

Preparation of the written report of the dissertation research. Variable credits. May be repeated. Graded S/U.

Clinical Psychopharmacology Courses**RXPP 5543 Anatomy and Physiology for Clinicians: 3 semester hours.**

This course provides a clinical approach to the study of the primary body systems (neurologic, musculoskeletal, renal, hepatic, cardiovascular, pulmonary, etc.) that is an integration of both foundational knowledge and application to practice. Will focus on both the structure and function of the primary body systems providing a base knowledge for future courses to build upon. PREREQ: Admission to the program

RXPP 5544 Cell and Molecular Neuroscience: 3 semester hours.

This course takes an interdisciplinary approach to combining principles from biochemistry and cell biology. Focus will be placed on cell structure, function, and metabolism, as well as inorganic and organic chemistry principles. PREREQ: Admission to the program

RXPP 6602 Introduction to Prescribing Psychologists: 1 semester hour.

This course will provide an introduction to clinical psychopharmacology, the biomedical model, medical ethics, medical decision-making, and the US healthcare system. PREREQ: Admission to the program

RXPP 6603 Supervised Clinical Experience I: 1 semester hour.

Each student will follow an approved supervising preceptor and observe the practical aspects of patient care, including physical and laboratory assessment and psychotropic medication prescribing. Specific requirements for hours to be completed and necessary documentation is available from the program. COREQ: NURS 6611 and NURS 6611L

RXPP 6604 Integrated Psychopharmacotherapy I: 3 semester hours.

This course will provide a systems-based therapeutic approach to the integrated management of psychopharmacology with an emphasis on the appropriate selection/monitoring of drug therapy, initiation and discontinuation of drug therapy, and providing patient education. PREREQ: RXPP 6603, COREQ: RXPP 6605, RXPP 6606

RXPP 6605 Integrated Psychopharmacotherapy II: 3 semester hours.

This course will continue to provide a systems based therapeutic approach to the integrated management of psychopharmacology with an emphasis on the appropriate selection/monitoring of drug therapy, initiation and discontinuation of drug therapy, and providing patient education. PREREQ: RXPP 6603; COREQ: RXPP 6604, RXPP 6606

RXPP 6606 Integrated Psychopharmacotherapy III: 3 semester hours.

This course will continue to provide a systems based therapeutic approach to the integrated management of psychopharmacology with an emphasis on the appropriate selection/monitoring of drug therapy, initiation and discontinuation of drug therapy, and providing patient education. PREREQ: RXPP 6603; COREQ: RXPP 6604, RXPP 6605

RXPP 6607 Professional and Legal Issues for Prescribing Psychologists: 3 semester hours.

This course will review ethical, legal, and other professional considerations to the practice of prescribing psychotropic medications, including informed consent, interprofessional relationships, and collaborative practice. PREREQ: RXPP 6602

RXPP 6608 Psychopharmacology Capstone: 3 semester hours.

This course will review all aspects of the prescribing process covered in the program curriculum as well as a discussion of special topics and current events of relevance to prescribing psychologists, including preparation for the PEP exam. The course will be student-led and incorporate presentations, discussions, and a variety of active learning techniques. PREREQ: RXPP 6607

RXPP 6610 Supervised Clinical Experience II: 1 semester hour.

Each student will collaborate with an approved supervising preceptor to provide patient care in different settings, including physical and laboratory assessment and supervised psychotropic medication prescribing. Specific requirements for hours to be completed, number of patients, and necessary documentation is available from the program. PREREQ: RXPP 6603; COREQ: RXPP 6608

Pharmacy Admin Courses***PADM 5538 Independent Problems in Pharmacy Administration: 1-4 semester hours.***

Independent study of various topics in pharmacy administration. May be repeated.

PADM 5554 Pharmacy Management I: 2 semester hours.

Principles of organization, management and financial analysis as applied to the practice of pharmacy. PREREQ: PPRA 5519.

PADM 5556 Pharmacy Management II: 2 semester hours.

Problems of management, merchandising, and salesmanship, applied to community pharmacy. PREREQ: PHAR 5554.

PADM 5599 Experimental Course: 1-6 semester hours.

This is an experimental course. The course title and number of credits are noted by course section and announced in the class schedule by the scheduling department. Experimental courses may be offered no more than three times. May be repeated.

PADM 6601 Graduate Seminar in Pharmacy Administration: 1 semester hour.

Discussion of current research and theories in pharmacy administration. May be repeated.

PADM 6603 Advanced Pharmacy Law: 3 semester hours.

Requirements of federal laws influencing the practice of pharmacy, including selected recent cases. PREREQ: PPRA 5519 or permission of instructor.

PADM 6605 Research Methods in Pharmacy Administration: 3 semester hours.

Methods in research design and analysis utilized in pharmacy administration research. PREREQ: Graduate level statistics course.

PADM 6610 Social and Behavioral Aspects of Pharmacy Practice: 3 semester hours.

Examination of sociological and psychological concepts and theories as applied to the practice of pharmacy. PREREQ: Permission of instructor.

PADM 6612 Ethics for Health Professionals: 3 semester hours.

Examination of ethical issues that arise in the provision of health care. PREREQ: Permission of instructor.

PADM 6624 Advanced Pharmacy Management I: 3 semester hours.

Principles of operation and management encountered in the drug distribution process. PREREQ: One year of accounting or permission of instructor.

PADM 6626 Advanced Pharmacy Management II: 3 semester hours.

Case studies of problems encountered in pharmacy management. PREREQ: PADM 6624.

PADM 6630 Advanced Drug Marketing: 3 semester hours.

Approaches and methods of marketing as applied to pharmacy and the drug distribution process.

PADM 6632 Medical Economics: 3 semester hours.

Examination of the market forces encountered in the medical care system.

PADM 6634 Advanced Pharmacy Administration I: 3 semester hours.

An integration of socio-behavioral and management principles into an advanced consideration of pharmacy administration.

PADM 6635 Advanced Pharmacy Administration II: 3 semester hours.

A continuation of PADM 6634, this course further explores issues in the discipline of pharmacy administration.

PADM 6649 Research in Pharmacy Administration: 1-2 semester hours.

Research problems ancillary to the thesis project. May be repeated. Graded S/U. PREREQ: Graduate standing and permission of instructor.

PADM 6650 Thesis Research: 1-10 semester hours.

1-10 Credits. May be repeated. Graded S/U.

PADM 6691 Topical Seminar in Pharmacy Administration: 2-4 semester hours.

Examination of selected topics in pharmacy administration. May be repeated.

PADM 6699 Experimental Course: 1-6 semester hours.

This is an experimental course. The course title and number of credits are noted by course section and announced in the class schedule by the scheduling department. Experimental courses may be offered no more than three times. May be repeated.

Pharmacy Practice Courses***PPRA 5596 Clinical Pharmacy Residency: 0 semester hours.***

Advance practical experience in clinical pharmacy practice. PREREQ: Must have a Doctor of Pharmacy degree.

PPRA 5599 Experimental Course: 1-6 semester hours.

This is an experimental course. The course title and number of credits are noted by course section and announced in the class schedule by the scheduling department. Experimental courses may be offered no more than three times. May be repeated.

PPRA 6699 Experimental Course: 1-6 semester hours.

This is an experimental course. The course title and number of credits are noted by course section and announced in the class schedule by the scheduling department. Experimental courses may be offered no more than three times. May be repeated.

Pharmacy Courses***PHAR 5599 Experimental Course: 1-6 semester hours.***

This is an experimental course. The course title and number of credits are noted by course section and announced in the class schedule by the scheduling department. Experimental courses may be offered no more than three times. May be repeated.

PHAR 6645 Pharmacotherapeutics for Advanced Practice Nurses: 3 semester hours.

A problem-based course emphasizing the fundamentals of drug action and the rational use of drugs to treat various organ system disease states. PREREQ: NURS 6620.

PHAR 6699 Experimental Course: 1-6 semester hours.

This is an experimental course. The course title and number of credits are noted by course section and announced in the class schedule by the scheduling department. Experimental courses may be offered no more than three times. May be repeated.