

# PHARMACEUTICAL SCIENCES (PHARMACOTHERAPY AND TRANSLATIONAL RESEARCH)

## Program Information

The College of Pharmacy offers the Doctor of Philosophy degree in Pharmaceutical Sciences with a concentration in Clinical Pharmaceutical Sciences and the Master of Science in Pharmacy (M.S.P.) in Pharmaceutical Sciences with a concentration in Clinical Pharmacy. The minimum requirements for these degrees are listed in the Graduate Degrees (<http://gradcatalog.ufl.edu/graduate/degrees/>) section of this Catalog.

The Clinical Pharmaceutical Sciences training program is a collaborative effort between the Departments of Pharmacotherapy and Translational Research and Pharmaceutics with the goal of preparing motivated individuals to pursue independent research careers in academia, industry, or government. The current research focus of the program is on understanding genetic and non-genetic factors that contribute to variability in drug response.

Students in the program conduct hypothesis-driven clinical research that includes a strong laboratory component. Excellent research facilities are available including state-of-the-art bioanalytical and pharmacogenomics laboratories, and an NIH-funded Clinical Translational Science Institute (CTSI) and Clinical Research Center (UF CRC (<https://www.ctsi.ufl.edu/research/uf-clinical-research-center/>)) for clinical study conduction. Upon completion of the core/elective curriculum and dissertation, the Doctor of Philosophy (Ph.D.) Degree is awarded.

Graduate students in the Clinical Pharmaceutical Sciences program are expected to actively participate in clinical practice experiences and are required to spend 200 hours (minimum) to 600 hours (recommended) in a clinical practice setting. These experiences strengthen clinical background and foster development of the student as a translational research scientist. Preference will be given to candidates who have earned a PharmD degree from an accredited school of pharmacy.

For more information, please see our websites: <http://ptr.pharmacy.ufl.edu/education/clinical-pharmaceutical-sciences> (<http://ptr.pharmacy.ufl.edu/education/clinical-pharmaceutical-sciences/>) and <http://ptr.pharmacy.ufl.edu>.

## Degrees Offered

### Degrees Offered With a Major in Pharmaceutical Sciences

- Doctor of Philosophy
  - without a concentration
  - concentration in Clinical Pharmaceutical Sciences
- Master of Science in Pharmacy
  - without a concentration
  - concentration in Clinical Pharmaceutical Sciences
  - concentration in Personalized Medicine

Requirements for these degrees are given in the Graduate Degrees (<http://gradcatalog.ufl.edu/graduate/degrees/>) section of this catalog.

## Courses

### Medicinal Chemistry Courses

Code	Title	Credits
PHA 6354	Natural Medicinal Products	3
PHA 6356	Structure Determination of Complex Natural Products	3
PHA 6357	Herbal & Dietary Supplements	3
PHA 6417	Pharmaceutical Analysis II	3
PHA 6425	Drug Biotrans and Molecular Mechanisms of Toxicity	3
PHA 6432	Fundamentals of Pharmaceutical Chemistry	1
PHA 6435	Biosynthetic Logic of Medicinal Natural Products	3
PHA 6444	Pharmaceutical Chemistry I	3
PHA 6447	Drug Design	3
PHA 6471	Synthetic Medicinal Chemistry	3
PHA 6472	Organic Synthesis of Drug Molecules	3
PHA 6476	Advanced Combinatorial Chemistry in Drug Discovery	3
PHA 6534	Toxicology of Chemical Weapons	3
PHA 6535	Principles of Nucleotide Activity	2
PHA 6543	Pharmaceutical Chemistry II	3
PHA 6556	Introduction to Clinical Toxicology	3
PHA 6557	Clinical Toxicology I	3
PHA 6840	Medicinal Chemistry of Drugs of Abuse	3
PHA 6850	Principles of Forensic Science	3
PHA 6851	Forensic Analysis of DNA	3
PHA 6853	Biological Evidence and Serology	3
PHA 6854	Forensic Immunology	3
PHA 6855	Forensic Genetics	3
PHA 6856	Blood Spatter and Distribution	3
PHA 6905C	Research Procedures in Medicinal Chemistry	1-4
PHA 6934	Seminar in Medicinal Chemistry	1
PHA 6852	Mammalian Molecular Biology	3
VME 6602	General Toxicology	3
VME 6605	Toxic Substances	3
VME 6613	Forensic Toxicology I	3
VME 6614	Forensic Toxicology II	3
VME 6650	Principles of Mammalian Pharmacology	4
VME 6766	Laboratory Quality Assurance/Quality Control	3

### Pharmaceutical Outcomes and Policy Courses

Code	Title	Credits
PHA 5270	Health Care and Patient Safety	3
PHA 5271	Health Care Risk Management	3
PHA 6227	Institutional Pharmacy Leadership I	3
PHA 6228	Institutional Pharmacy Leadership II	3
PHA 6250	Patient Responsibility in Health Care	3
PHA 6264	Pharmacoeconomics and Health Technology Assessment	3
PHA 6265	Introduction to Pharmaceutical Outcomes and Policy I	3
PHA 6266	Introduction to Pharmaceutical Outcomes and Policy II	2
PHA 6268	Pharmacoepidemiology and Patient Safety	3
PHA 6269	Pharmaceutical Products and Public Policy	3
PHA 6273	Structure, Process and Outcomes of Regulation I	2

PHA 6274	Federal Regulations of Drugs and Pharmacy	3
PHA 6275	Federal Regulations of Controlled Substances	3
PHA 6276	Pharmacy Benefit Design & Management	3
PHA 6277	Ethics in Drug Development Production and Use	3
PHA 6278	State Regulation of Drugs and Pharmacy	3
PHA 6279	Pharmaceutical Outcomes and Policy Seminar	1
PHA 6280	Medicare and Medicaid	3
PHA 6283	Commercial Applications of Pharmacoeconomics	3
PHA 6286	Pharmaceutical Microeconomics	3
PHA 6287	Pharmaceutical Health Economics	3
PHA 6288	Critical Review of Research Methods	3
PHA 6289	Regulating Clinical Research	3
PHA 6472	Organic Synthesis of Drug Molecules	3
PHA 6476	Advanced Combinatorial Chemistry in Drug Discovery	3
PHA 6717	Measurement in Pharmaceutical Outcomes and Policy Research	3
PHA 6793	Evidentiary Basis of Pharmaceutical Use	3
PHA 6796	Study Design in Pharmaceutical Outcomes & Policy Research	3
PHA 6798	The Use and Abuse of Statistics in Drug Regulation	3
PHA 6799	Medication Safety & Quality Program Evaluation	3
PHA 6805	Applied Data Interpretation and Reporting of Findings in Pharmacy	3
PHA 6891	Introduction to Pharmacoepidemiology	3
PHA 6892	Practices and Procedures of the IRB	3
PHA 6893	Research Ethics	3
PHA 6899	Advanced OB/GYN and Pediatric Pharmacoepidemiology	3
PHA 6937	Topics in Pharmaceutical Administration	2

## Pharmacodynamics Courses

Code	Title	Credits
PHA 6472	Organic Synthesis of Drug Molecules	3
PHA 6476	Advanced Combinatorial Chemistry in Drug Discovery	3
PHA 6508	Systems Physiology and Pathophysiology I	3
PHA 6509	Systems Physiology and Pathophysiology II	3
PHA 6512L	Experiential Research Training in Pharmacodynamics	1-4
PHA 6521C	Research Techniques in Pharmacodynamics	1
PHA 7939	Journal Club in Pharmaceutical Sciences	1

## Pharmacology Courses

Code	Title	Credits
GMS 6563	Molecular Pharmacology	1-3
GMS 6590	Seminar in Pharmacology	1
GMS 6592	Ion Channels Journal Club: Pharmacology, Biophysics, and Neuroscience of Excitable Membranes	1
GMS 6847	Translational Research and Therapeutics: Bench, Bedside, Community, & Policy	3
GMS 7593	Topics in Pharmacology and Toxicology	1-3

## Pharmacotherapy and Translational Research Courses

Code	Title	Credits
GMS 7877	Responsible Conduct of Biomedical Research	1
PCB 5065	Advanced Genetics	4
PHA 6134	Foundations in Precision Medicine: Genomic Technologies	1
PHA 6427	Pharmacogenetics of Drug Metabolism	2
PHA 6449	Pharmacogenomic and Genomic Data Analysis	3
PHA 6476	Advanced Combinatorial Chemistry in Drug Discovery	3
PHA 6630	Medication Therapy Management: A Hematologic Focus	3
PHA 6631	Foundations of Medication Therapy Management I	3
PHA 6632	Foundations of Medication Therapy Management II	3
PHA 6633	Medication Therapy Management: A Cardiovascular Focus	3
PHA 6634	Medication Therapy Management: An Endocrine Focus	3
PHA 6635	Medication Therapy Management: A Renal Focus	3
PHA 6636	Medication Therapy Management: A Gastrointestinal Focus	3
PHA 6637	Medication Therapy Management: A Psychiatric Focus	3
PHA 6638	Medication Therapy Management: A Neurologic Focus	3
PHA 6639	Medication Therapy Management: A Respiratory Focus	3
PHA 6910	Supervised Research	1-5
PHA 6935	Selected Topics in Pharmacy	1-4
PHA 6936	Advanced Topics in Pharmaceutical Sciences	1-2
PHA 6938	Research Seminar	1
PHA 6940	Supervised Teaching	1-5
PHA 6971	Research for Master's Thesis	1-15
PHA 7979	Advanced Research	1-12
PHA 7980	Research for Doctoral Dissertation	1-15
PHC 6001	Principles of Epidemiology in Public Health	3

## Pharmaceutics Departmental Courses

Code	Title	Credits
PHA 6116	In Vivo and In Vitro Stability of Drugs	3
PHA 6125	Introduction to Quantitative Pharmacology	3
PHA 6131	Physiologically-Based Modeling	3
PHA 6133	Translational Clinical Pharmacology	3
PHA 6170C	Pharmaceutical Product Formulation	3
PHA 6183	Pharmaceutical Gene Delivery	3
PHA 6185	Life Cycle of a Drug	1
PHA 6416	Pharmaceutical Analysis I	3
PHA 6418	Model-Informed Drug Development	3
PHA 6449	Pharmacogenomic and Genomic Data Analysis	3
PHA 6476	Advanced Combinatorial Chemistry in Drug Discovery	3
PHA 6630	Medication Therapy Management: A Hematologic Focus	3

PHA 6631	Foundations of Medication Therapy Management I	3	methods, results, and significance of the literature to faculty and students.
PHA 6632	Foundations of Medication Therapy Management II	3	SLO 4
PHA 6633	Medication Therapy Management: A Cardiovascular Focus	3	Research Skills
PHA 6634	Medication Therapy Management: An Endocrine Focus	3	Utilize the scientific method to formulate hypotheses based on their ability to use the literature, their own experimental observations, and those of others; design a technically sound and up-to-date experimental plan with appropriate controls; execute the experimental plan in a technically proficient manner; interpret the data; reformulate the hypotheses.
PHA 6635	Medication Therapy Management: A Renal Focus	3	
PHA 6636	Medication Therapy Management: A Gastrointestinal Focus	3	SLO 5
PHA 6637	Medication Therapy Management: A Psychiatric Focus	3	Professional Behavior
PHA 6638	Medication Therapy Management: A Neurologic Focus	3	Exhibit behaviors and values that are consistent with ethical standards in research appropriate to safety, administrative, and regulatory rules.
PHA 6639	Medication Therapy Management: A Respiratory Focus	3	Professionalism, safety and adherence to regulations will be monitored by the student's mentor.
PHA 6740	Fundamentals of Grant Writing in the Pharmaceutical Sciences	1	SLO6
PHA 6894	Introduction to Graduate Studies	1	Professional Presentations
PHA 6896	Preclinical Drug Evaluation	2	Deliver a formal scholarly presentation of his or her original research results in oral and written formats at an internal academic review. These presentations will be clear in providing information at an appropriate level to the audience, complete in providing the necessary and relevant background from the literature, and will utilize appropriate audiovisual aids that are clearly constructed.
PHA 6910	Supervised Research	1-5	
PHA 6935	Selected Topics in Pharmacy	1-4	
PHA 6936	Advanced Topics in Pharmaceutical Sciences	1-2	
PHA 6938	Research Seminar	1	
PHA 6940	Supervised Teaching	1-5	
PHA 6971	Research for Master's Thesis	1-15	
PHA 7979	Advanced Research	1-12	
PHA 7980	Research for Doctoral Dissertation	1-15	

## Pharmaceutical Sciences - Pharmacotherapy and Translational Research (M.S.P.)

SLO 1	Knowledge	Identify, interpret, and utilize core knowledge across the spectrum of Pharmaceutical Sciences.
SLO 2	Problem-Solving/Critical Thinking	Analyze and apply material from foundation courses in the curriculum, interpret data, and synthesize a response to a complex problem or case.
SLO 3	Professional Communication	Deliver a presentation of a discipline-specific topic related to Pharmaceutical Sciences for internal academic review. These presentations will be clear in providing information at an appropriate level to the audience, complete in providing the necessary and relevant background from the literature, and will utilize appropriate audiovisual aids that are clearly constructed.

## College of Pharmacy Courses

Code	Title	Credits
PHA 6356	Structure Determination of Complex Natural Products	3
PHA 6418	Model-Informed Drug Development	3
PHA 6471	Synthetic Medicinal Chemistry	3

### Student Learning Outcomes

## PHARMACEUTICAL SCIENCES (PH.D.)

SLO 1	Knowledge	Identify, interpret, and utilize core knowledge across the spectrum of Pharmaceutical Sciences as it relates to the student's research. At the most advanced level, this will include interpreting experimental data and designing experiments.
SLO 2	Problem Solving/Critical Thinking	Apply discipline- and research project-related knowledge to complete the student's dissertation research by formulating hypotheses, designing experiments, interpreting results, and forming conclusions from their experiments.
SLO 3	Skills	Discuss and defend the published literature of the Pharmaceutical Sciences field. The students will present analysis of the literature in a formal, structured class setting to clearly convey the background,