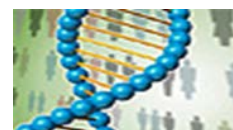


## SCIENTIFIC DISCIPLINES

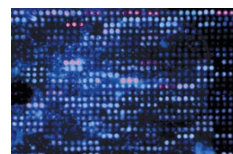
The pharmaceutical sciences comprise a broad range of disciplines critical to the discovery and development of new drugs. Fundamental principles are used to understand how chemicals in the body produce health and/or toxic effects. Research conducted by faculty within the Department of Pharmaceutical Sciences is divided into the three areas listed below.



### PHARMACOLOGY AND TOXICOLOGY



Pharmacology focuses on the uses, effects, and modes of action of drugs whereas toxicology centers around the harmful effects of exposures to chemicals. Both scientific disciplines provide an understanding of the mechanisms by which chemical substances heal or injure the body. Faculty in the pharmacology and toxicology group conduct multidisciplinary research on mechanistic studies related to health and disease at the cellular and molecular levels. They also provide local, regional, and national expertise.



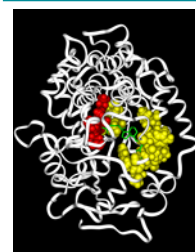
### PHARMACEUTICS AND DRUG DELIVERY

Pharmaceutics combines the physical, chemical, biological, medicinal and engineering sciences to characterize and optimize drug delivery to the body. This field focuses on the formulation of delivery systems and devices and the analysis of drug performance using *in vitro* and *in vivo* methods. Included in this discipline is the pharmacokinetics and pharmacodynamics of drug products.

Our pharmaceutics faculty use physicochemical, mathematical, and biological approaches to elucidate mechanisms of targeted drug delivery using different routes of administration to optimize therapeutic response. Faculty research is centered around targeting drug delivery to improve efficacy.



### MEDICINAL AND ANALYTICAL CHEMISTRY



The medicinal and analytical chemistry faculty are broadening our understanding of various disease states and biologic pathways. Their research bridges basic science and clinical applications to understand mechanisms of chemical injury and damage resulting from oxidative stress and free radical production. Faculty are investigating drug metabolism and structure-activity relationships, as well as developing novel agents for the diagnosis and treatment of diseases.

## FACULTY



▶ **Alicia Bolt, Ph.D.**  
Mechanisms of metal-enhanced tumorigenesis; role of the tumor microenvironment to drive tumor promotion; metal immunotoxicity



▶ **Scott W. Burchiel, Ph.D.**  
Effects of environmental agents on the immune system; gene-environment interactions; human immunotoxicology



▶ **Matthew Campen, Ph.D.**  
Cardiovascular health effects of inhaled substances along with basic research on vascular pathophysiology



▶ **Dawn Delfin, Ph.D.**  
Enhancing the interaction between cardiac stem cells and the heart's extracellular matrix for novel heart failure treatments



▶ **Eszter Erdei, Ph.D.**  
Autoimmune molecular markers; Tribal community-based participatory research; integration of human immune responses with exposure to metals and xenobiotics



▶ **Linda A. Felton, Ph.D.**  
Modified release drug delivery; polymeric film coating; formulation development and manufacturing drug products for clinical trials



▶ **Changjian 'Jim' Feng, Ph.D.**  
Roles of metals in life processes with an emphasis on molecular mechanisms of nitric oxide synthase isoform regulation



▶ **Don Godwin, Ph.D.**  
Scholarship of teaching and learning with emphasis on innovative methods to enhance problem solving and critical thinking.



▶ **Pamela Hall, Ph.D.**  
Host defense against methicillin-resistant *Staphylococcus aureus* and therapeutic interventions targeting MRSA virulence



▶ **Laurie G. Hudson, Ph.D.**  
Regulation of epithelial plasticity in metastasis and wound repair; novel therapeutics for ovarian cancer; mechanisms of arsenic carcinogenesis



▶ **Johnnye Lewis, Ph.D.**  
Effects of metals exposures in tribal populations, metals toxicology, and intervention design and implementation



▶ **Ke Jian 'Jim' Liu, Ph.D.**  
Mechanisms of arsenic carcinogenesis; brain and vascular injury in stroke; free radical and oxidative stress in disease development



▶ **Debra MacKenzie, Ph.D.**  
Immunotoxicology of metals and metal exposures in populations; Experimental therapeutics for prostate cancer and melanoma



▶ **Jason McConville, Ph.D.**  
Drug delivery in cancer, infection, and other diseases; pulmonary drug delivery; nanomedicine; buccal drug delivery



▶ **Pavan Muttil, Ph.D.**  
Novel drug and vaccine delivery; formulation and characterization of nano- and micro-particles for pulmonary delivery



▶ **Todd A. Thompson, Ph.D.**  
Experimental therapeutics for cancer; toxicity of androgenic endocrine disruptors; drug discovery; pharmacogenomics



▶ **Graham Timmins, Ph.D.**  
Stable isotope compounds for the diagnosis and treatment of infectious diseases; role of UV-induced radicals in melanoma



▶ **Mary K. Walker, Ph.D.**  
Mechanisms of cardiovascular protective effects of omega-3 polyunsaturated fatty acids

## GRADUATE PROGRAMS

Admission to our graduate programs is through the College of Pharmacy, the Biomedical Sciences Graduate Program (BSGP), and the Nanoscience and Microsystems Engineering (NSMS) Program, depending on the interests of the student. Courses taught by our faculty include Molecular and Cellular Pharmacology (PHRM 576), General Toxicology (PHRM 580), Pharmaceutical Sciences & Toxicology Seminar (PHRM 593), Advanced Organ-Based Pharmacology courses (PHRM 598), Drug Product Development (PHRM 598), and Pharmacogenomics (PHRM 536). We also offer a Doctor of Pharmacy (Pharm.D.)/Master's dual degree program.

## CAREERS AND OPPORTUNITIES

Pharmaceutical scientists are typically involved in the development of new drugs and diagnostics while toxicologists generally focus on the health of humans, animals, and the environment by ensuring the safety of medicines, household chemicals, agricultural products, and nanomaterials. Graduates from our department find employment in pharmaceutical and biotechnology companies, Universities and research centers, the National Laboratories, and federal agencies such as the U.S. Food and Drug Administration (FDA) and the Environmental Protection Agency (EPA).