

Department of Pharmaceutical Sciences

Brian Paegel, Department Chair

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<https://pharmsci.uci.edu/departments/pharmaceutical-sciences/>

The Department of Pharmaceutical Sciences offers Bachelor of Science (B.S.), Master of Science in Pharmacology (M.S.), and Doctor of Philosophy (Ph.D.) students unparalleled training for future careers in the health sciences, as well as biomedical research. Our innovative, rigorous curriculum integrates concepts from biology, chemistry, chemical engineering, pharmacology and physiology. Alumni pursue exciting professional opportunities that improve our societies health and well-being.

Pharmaceutical Scientists are rapidly changing the field of drug discovery and development. Graduates of our programs are well qualified to seek employment in the public and private sectors, or pursue graduate degrees such as Ph.D., M.D., or Pharm.D.

Faculty

Amal Alachkar, Ph.D. University of Manchester, *Professor of Teaching of Pharmaceutical Sciences* (neurotransmitter systems, molecular pharmacology, neuropsychopharmacology)

Lauren Albrecht, Ph.D. Northwestern University, *Assistant Professor of Pharmaceutical Sciences; Developmental and Cell Biology*

Claudia Benavente, Ph.D. University of Arizona, *Associate Professor of Pharmaceutical Sciences; Developmental and Cell Biology* (genetics, epigenetics, cancer, pediatric cancer, retinoblastoma, osteosarcoma)

A. Richard Chamberlin, Ph.D. University of California, San Diego, *Professor Emeritus of Pharmaceutical Sciences* (chemical biology, organic and synthetic)

John Charles Chaput, Ph.D. University of California, Riverside, *Professor of Pharmaceutical Sciences; Chemistry; Molecular Biology and Biochemistry* (chemical and synthetic biology)

Olivier Civelli, Ph.D. Swiss Federal Institute of Technology in Zurich, *Distinguished Professor of Pharmaceutical Sciences; Developmental and Cell Biology* (novel neuroactive molecules, molecular neuropharmacology)

Kelvin W. Gee, Ph.D. University of California, Davis, *Professor Emeritus of Pharmaceutical Sciences*

Celia Goulding, Ph.D. King's College London, *Professor of Molecular Biology and Biochemistry; Pharmaceutical Sciences*

Stephen Hanessian, Ph.D. Ohio State University, *UCI Distinguished Professor of Pharmaceutical Sciences; Chemistry* (organic chemistry, medicinal chemistry)

Naoto Hoshi, Ph.D. Kanazawa University, *Professor of Pharmaceutical Sciences; Physiology and Biophysics*

Mahtab F. Jafari, Pharm.D. University of California, San Francisco, *Director of the Center for Healthspan Pharmacology and Professor of Pharmaceutical Sciences; Clinical Pharmacy Practice; Ecology and Evolutionary Biology* (anti-aging pharmacology and preventive medicine)

Diana N. Krause, Ph.D. University of California, Los Angeles, *Adjunct Professor Emeritus of Pharmaceutical Sciences*

Young Jik Kwon, Ph.D. University of Southern California, *Professor of Pharmaceutical Sciences; Chemical and Biomolecular Engineering; Molecular Biology and Biochemistry* (gene therapy, drug delivery, cancer-targeted therapeutics, artificially-induced cellular vesicles, multi-modal therapies)

Frances L. Leslie, Ph.D. University of Aberdeen, *Professor Emeritus of Pharmaceutical Sciences*

Andrej Luptak, Ph.D. Yale University, *Department Chair and Professor of Pharmaceutical Sciences; Chemistry; Molecular Biology and Biochemistry* (chemical biology)

Thomas Martinez, Ph.D. California Institute of Technology, *Assistant Professor of Pharmaceutical Sciences; Biological Chemistry*

Glenn Micalizio, Ph.D. University of Michigan, *Professor of Pharmaceutical Sciences*

David L. Mobley, Ph.D. University of California, Davis, *Professor of Pharmaceutical Sciences; Chemistry* (chemical biology, physical chemistry and chemical physics, theoretical and computational)

Brian Paegel, Ph.D. University of California, Berkeley, *Associate Dean of Research and Professor of Pharmaceutical Sciences; Biomedical Engineering; Chemistry* (chemical biology, drug discovery, drug discovery, miniaturization, evolution)

Lawrence Plon, Pharm.D. M.A. University of Southern California, *Associate Adjunct Professor of Pharmaceutical Sciences; Clinical Pharmacy Practice*

Thomas L. Poulos, Ph.D. University of California, San Diego, *Professor Emeritus of Molecular Biology and Biochemistry; Pharmaceutical Sciences* (chemical biology)

Samuel E. Schriener, Ph.D. University of Washington, *Vice Chair and Associate Professor of Teaching of Pharmaceutical Sciences* (aging, genetics, biochemistry, mitochondria)

J. Benita Sjogren, Ph.D. Karolinska Institute, *Assistant Professor of Pharmaceutical Sciences; Biological Chemistry*

Robert Spitale, Ph.D. University of Rochester, *Professor of Pharmaceutical Sciences; Molecular Biology and Biochemistry* (chemistry, chemical biology, RNA biology)

Darci Trader, Ph.D. Indiana University, *Associate Professor of Pharmaceutical Sciences; Chemistry*

Weian Zhao, Ph.D. McMaster University, *Professor of Pharmaceutical Sciences; Biomedical Engineering* (stem cell therapy, diagnostics, biosensors, immunotherapy, single-cell analysis)

Qun-Yong Zhou, Ph.D. Oregon Health & Science University, *Professor of Pharmaceutical Sciences*

Affiliate Faculty

Kevin T. Beier, Ph.D. Harvard University, *Associate Director, Interdepartmental Neuroscience Program and Associate Professor of Physiology and Biophysics; Biomedical Engineering; Neurobiology and Behavior; Pharmaceutical Sciences* (neuroscience, neural circuits, neural plasticity, molecular neuroscience, behavior, technique development, viral-genetic)

Emiliana Borrelli, Ph.D. University of Strasbourg, *Chancellor's Professor of Microbiology and Molecular Genetics; Pharmaceutical Sciences*

Rémi Buisson, Ph.D. Université Laval, *Assistant Professor of Biological Chemistry; Pharmaceutical Sciences*

Alexandre Chan, Pharm.D. Rutgers University, *Department Chair and Professor of Clinical Pharmacy Practice; Pharmaceutical Sciences*

Melanie Cocco, Ph.D. Pennsylvania State University, *Associate Professor of Molecular Biology and Biochemistry; Pharmaceutical Sciences*

Dan M. Cooper, M.D. University of California, San Francisco, *Senior Associate Dean, Clinical Translational Science and Associate Vice Chancellor, Clinical Translational Research and Professor of Pediatrics; Biomedical Engineering; Pharmaceutical Sciences*

Fangyuan Ding, Ph.D. École Normale Supérieure de Paris, *Assistant Professor of Biomedical Engineering; Developmental and Cell Biology; Pharmaceutical Sciences* (quantitative single molecule biology and engineering, systems biology, nucleic-acid based therapies, single cell research tool developments)

Aimee Lara Edinger, Ph.D. University of Pennsylvania, *Professor of Developmental and Cell Biology; Pharmaceutical Sciences* (cancer biology and metabolism, growth control, protein trafficking)

Philip Felgner, Ph.D. Michigan State University, *Professor in Residence of Physiology and Biophysics; Pharmaceutical Sciences* (vaccines, gene therapy, drug delivery, liposomes, biophysics, protein microarray, epidemiology)

Steven A.N. Goldstein, M.D., Ph.D. Harvard University, *Vice Chancellor for Health Affairs and Distinguished Professor of Physiology and Biophysics; Pharmaceutical Sciences* (albumins, cnidarian venoms, drug design, gain of function mutation, inflammation mediators, ion channels, Kv1.3 potassium channel, CAV1.2 voltage-gated sodium channel, neurotoxins, neutrophils, potassium channel blockers, potassium channels, sea anemones, sperm capacitation, sumoylation)

Matthew E. Griffin, Ph.D. California Institute of Technology, *Assistant Professor of Chemistry; Molecular Biology and Biochemistry; Pharmaceutical Sciences* (chemical biology)

Kalpna Gupta, Ph.D. Allahabad University, All India Institute of Medical Sciences, *Professor in Residence of Medicine; Pharmaceutical Sciences*

Ryan Hayes, Ph.D. Rice University, *Assistant Professor of Chemical and Biomolecular Engineering; Pharmaceutical Sciences* (computational protein engineering, therapeutics, biocatalysis, drug design, molecular simulation)

Lan Huang, Ph.D. University of Florida, *Graduate Advisor and Professor of Physiology and Biophysics; Biological Chemistry; Biomedical Engineering; Pharmaceutical Sciences* (biological mass spectrometry/proteomics, posttranslational modifications, protein complexes, protein-protein interaction, ubiquitin-proteasome degradation pathways)

Haoping Liu, Ph.D. Cornell University, *Professor of Biological Chemistry; Pharmaceutical Sciences*

Wendy F. Liu, Ph.D. Johns Hopkins University, *Professor of Biomedical Engineering; Chemical and Biomolecular Engineering; Molecular Biology and Biochemistry; Pharmaceutical Sciences* (biomaterials, microdevices in cardiovascular engineering, cell-cell and cell-micro-environment interactions, cell functions and controls)

Shahrdad Lotfipour, Ph.D. University of California, Irvine, *Associate Professor of Emergency Medicine; Pathology and Laboratory Medicine; Pharmaceutical Sciences*

Reginald McNulty, Ph.D. University of California, Irvine, *Assistant Professor of Molecular Biology and Biochemistry; Pharmaceutical Sciences*

Benjamin Morehouse, Ph.D. Brandeis University, *Assistant Professor of Molecular Biology and Biochemistry; Pharmaceutical Sciences*

Seyed Ali Mortazavi, Ph.D. California Institute of Technology, *Professor of Developmental and Cell Biology; Biological Chemistry; Pharmaceutical Sciences* (functional genomics to study transcriptional regulation in development)

Trina M. Norden-Krichmar, Ph.D. University of California, San Diego, *Emeritus Associate Professor of Epidemiology and Biostatistics; Pharmaceutical Sciences*

James S. Nowick, Ph.D. Massachusetts Institute of Technology, *UCI Distinguished Professor of Chemistry; Molecular Biology and Biochemistry; Pharmaceutical Sciences* (chemical biology, organic and synthetic, polymer, materials, nanoscience)

Daniele Piomelli, Ph.D. Columbia University, *Louise Turner Arnold Endowed Chair in the Neurosciences and Distinguished Professor of Anatomy and Neurobiology; Biological Chemistry; Pharmaceutical Sciences*

Jennifer A. Prescher, Ph.D. University of California, Berkeley, *Professor of Chemistry; Molecular Biology and Biochemistry; Pharmaceutical Sciences* (chemical biology, organic and synthetic)

Nicole Sparks, Ph.D. University of California, Riverside, *Assistant Professor of Environmental and Occupational Health; Pharmaceutical Sciences*

Shiou-Chuan (Sheryl) Tsai, Ph.D. University of California, Berkeley, *Professor of Molecular Biology and Biochemistry; Chemistry; Pharmaceutical Sciences*

Christopher Vanderwal, Ph.D. Scripps Research Institute, *Department Vice Chair and Professor of Chemistry; Pharmaceutical Sciences* (organic and synthetic)

Gregory A. Weiss, Ph.D. Harvard University, *Professor of Chemistry; Molecular Biology and Biochemistry; Pharmaceutical Sciences* (analytical, chemical biology, organic and synthetic, polymer, materials, nanoscience)

Xiaolin Zi, Ph.D. Shanghai University, *Professor of Urology; Pharmaceutical Sciences*

Pharmaceutical Sciences Courses

PHRMSCI 1. New Student Seminar. 1 Unit.

Weekly meetings consisting of presentations by faculty, professional staff, and Peer Academic Advisors provide information about the Pharmaceutical Sciences major, campus resources, learning skills, and special programs and opportunities.

Grading Option: Pass/Not Pass only

Restrictions: Pharmaceutical Sciences majors only. New students only.

PHRMSCI 3. Professional Development and Careers in the Pharmaceutical Sciences. 0 Units. 1 Workload Units.

Designed to help Pharmaceutical Science majors select a career track and prepare for graduate program applications and careers in industry.

Restrictions: Pharmaceutical Sciences majors only.

PHRMSCI 42. Life 101 . 2 Units.

Covers the latest scientific work on the impact of nutrition, exercise, and lifestyle choices on mental and physical health. Motivates students to make positive changes by fostering personal growth.

PHRMSCI 66. Gateway to Drugs. 4 Units.

Introduces students to human physiology, how drugs work, and where they come from, common health issues and the drugs used to treat them, and well-known recreational drugs.

(II)

PHRMSCI 76. Ethical Conduct of Research. 2 Units.

Covers the ethical responsibilities of biomedical scientists. Topics include, as discussions and case studies, the high standards of science, the responsible conduct of research, animal experimentation, and clinical trials as they relate to the pharmaceutical sciences.

PHRMSCI H80. Drugs and Society. 4 Units.

Where drugs come from, how drugs work, how and why people abuse drugs, the costs of drug abuse on society, which drugs are commonly abused, and how drug abuse can be prevented and treated. Course intended for non-science majors.

Prerequisite: Recommended: High school chemistry and biology.

Restrictions: Campuswide Honors Collegium only.

(II)**PHRMSCI 90. The Art of Public Speaking. 4 Units.**

Students learn to effectively prepare and present public speeches and slide presentations. Included are storytelling, informative, commemorative, and persuasive speeches, and scientific presentation. Evaluating speeches and strategies to reduce speaker apprehension is also covered.

Restrictions: Pharmaceutical Sciences majors have the first consideration for enrollment.

PHRMSCI 120. Human Physiology. 4 Units.

Covers the function of the human body. All major organ systems are discussed. Designed to prepare students for healthcare careers, such as medicine, pharmacy, dentistry, and for research careers which require basic knowledge of how the human body functions.

Prerequisite: BIO SCI 97 and CHEM 1C.

Overlaps with BIO SCI E109.

PHRMSCI 120L. Human Physiology Lab. 2 Units.

Designed to complement PHRMSCI 120. Computer-based lab simulations are used to study the function of the human body. Class physically meet for review sessions and exams.

Prerequisite: BIO SCI 97 and CHEM 1C.

Overlaps with BIO SCI E112L.

PHRMSCI 121. Human Anatomy with Pathological Correlates. 5 Units.

Covers the forms of, and relationships between, the many anatomical components of the human body, including discussion of several pathological conditions of the body as they relate to anatomy.

Prerequisite: BIO SCI 97 and BIO SCI 98 and BIO SCI 99. Recommended: Organic Chemistry series is highly encouraged.

Overlaps with BIO SCI 136, BIO SCI 170.

Restrictions: Pharmaceutical Sciences majors have the first consideration for enrollment.

PHRMSCI 122. Medical Microbiology. 4 Units.

Introduces students to all of the traditional topics covered in a typical microbiology lecture. Emphasis on microorganisms that are medically important and drive human disease and mortality.

Prerequisite: BIO SCI 99 and CHEM 51C and BIO SCI E109.

PHRMSCI 122L. Medical Microbiology Laboratory. 3 Units.

An introduction to the structure, metabolism, cultivation, isolation, classification, and identification of the major groups of bacteria. Additional focus on identification of infection and use of antibiotics in diseased patients.

Prerequisite: BIO SCI 99 and CHEM 51C with a minimum grade of C-.

PHRMSCI 142. Healthspan Sciences. 4 Units.

Covers the complex and multi-factorial process of aging and increases the understanding of factors that contribute to enhanced lifespan, including basic principles of health and wellness and scientifically proven interventions, both pharmacological and non-pharmacological.

Prerequisite: BIO SCI 98 and BIO SCI 99 and PHRMSCI 120.

PHRMSCI 155. Neuropsychopharmacology. 4 Units.

Mechanisms underlying chemical signaling processes in the nervous system. Fundamental knowledge for understanding the cellular and molecular actions of drugs and their mechanisms of action on synaptic transmission. Applied neuropsychopharmacology including major drug classes and therapeutic uses.

PHRMSCI 163. Pharmacogenomics and Epigenetics. 4 Units.

Survey of the genetic and epigenetic basis of inter-subject variability in response to drugs. Covers drug efficacy, safety, and need for their optimization in pharmacotherapy. Emphasizes genetic mechanisms of polymorphisms in the pharmacokinetics and pharmacodynamics of representative therapeutic drugs.

Prerequisite: BIO SCI 99.

Concurrent: PHRMSCI 263

PHRMSCI 170A. Molecular Pharmacology I. 4 Units.

Molecular basis of drug-receptor action at the molecular and cellular levels. Structure-function of drug targets emphasizing enzymes, ion channels, and membrane transport proteins. Understanding how the drugs' mechanisms of action contribute to the development of more efficacious and safer drugs.

Corequisite: CHEM 51C.

Prerequisite: (CHEM 51C or CHEM H52C) and (PHRMSCI 120 or BIO SCI E109).

Restrictions: Pharmaceutical Sciences majors have the first consideration for enrollment.

PHRMSCI 170B. Molecular Pharmacology II. 4 Units.

Introductory survey covering the molecular mechanisms of drugs that target the nervous system, such as anxiolytics, antidepressants, antipsychotics, hypnotics, muscle relaxants, and recreational drugs; drugs related to the immune system, including antibiotics, antihistamines, and immunosuppressants; drugs used to treat cancer.

Prerequisite: PHRMSCI 170A.

PHRMSCI 171. Physical Biochemistry. 4 Units.

Thermodynamics and kinetic fundamentals as applied to problems relevant to pharmaceutical sciences such as receptor/enzyme-ligand interactions. Fundamentals of biophysical methods used in the pharmaceutical sciences including structure determination and biomolecular spectroscopy.

Prerequisite: (PHYSICS 3C or PHYSICS 7E) and (CHEM 1C or CHEM H2C) and BIO SCI 99.

Restrictions: Pharmaceutical Sciences majors have the first consideration for enrollment.

PHRMSCI 172. Topics in Pharmaceutical Sciences. 2 Units.

Presents information about various fields of research, study, careers, and graduate school opportunities in pharmaceutical sciences. Taught by guest lecturers from various disciplines including 199 research course faculty. Helps Pharmaceutical Sciences students select electives appropriate to their future goals.

Corequisite: CHEM 51C or CHEM H52C.

Grading Option: Pass/Not Pass only

PHRMSCI 173. Pharmacotherapy. 4 Units.

An exploration of the clinical application of medications to selected disease states. Focus is on an understanding of underlying principles of pharmacology and how this knowledge can be applied to treatment of diseases.

Prerequisite: PHRMSCI 170B (may be taken concurrently).

PHRMSCI 174. Biopharmaceutics and Nanomedicine. 4 Units.

Introduces theories and tools of new drug formulations. Particularly new novel therapeutics based on biological materials, pathological characteristics utilized to achieve the maximum efficacy and specificity, and drug delivery systems based on emerging nanotechnology are extensively discussed.

Prerequisite: PHRMSCI 177 and PHRMSCI 177L.

Restrictions: Pharmaceutical Sciences majors have the first consideration for enrollment.

PHRMSCI 174L. Biopharmaceutics and Nanomedicine Lab. 3 Units.

Introduction to cancer drug screening using cellular models, and confirmation of comprehensive therapeutic efficacy using a live animal model. Includes basic cell culture, cytotoxicity assays, cell analysis, drug circulation test, and tumor eradication and imaging experiments. Materials Fee

Corequisite: PHRMSCI 174.

Prerequisite: PHRMSCI 177 and PHRMSCI 177L.

(Ib)

PHRMSCI 175. Drug Discovery Computing Techniques. 4 Units.

Techniques used in computer-aided drug discovery, including theory behind these techniques and practical applications. Topics include scientific computing; python; classical force fields and simulations; visualization and movie-making; quantum mechanics in drug discovery; molecular dynamics; solvation models; and several others.

Prerequisite: CSE 41 or I&C SCI 31. CSE 42 or I&C SCI 32 is recommended.

Concurrent: PHRMSCI 275

PHRMSCI 177. Medicinal Chemistry. 4 Units.

An introduction of the basics of drug activity and mechanisms. Strategies used to identify lead compounds such as natural product chemistry, combinatorial chemistry, molecular modeling, and high-through put screening. Relationship of molecular structure to pharmacological activity.

Prerequisite: CHEM 51A and CHEM 51B and CHEM 51C and (BIO SCI 98 or CHEM 128).

Same as CHEM 177

Restrictions: Pharmaceutical Sciences majors have the first consideration for enrollment.

PHRMSCI 177L. Medicinal Chemistry Laboratory. 3 Units.

An introduction of the basics of drug activity and mechanisms. Strategies used to identify lead compounds such as natural product chemistry, combinatorial chemistry, molecular modeling, and high-through put screening. Relationship of molecular structure to pharmacological activity. Materials Fee

Corequisite: PHRMSCI 177 or CHEM 177.

Prerequisite: CHEM 51A and CHEM 51B and CHEM 51C and (BIO SCI 98 or CHEM 128).

Same as CHEM 177L

Restrictions: Pharmaceutical Sciences majors have the first consideration for enrollment.

(Ib)

PHRMSCI 179. Emerging Technologies in Pharmaceutical Sciences and Medicine. 4 Units.

Introduces emerging, ground-breaking technologies in pharmaceutical sciences and medicine, including pharmacogenomics, genome editing, and stem cell and engineered T cell therapies. Explores these novel technologies with both their underlying theories and forward-thinking applications.

Concurrent: PHRMSCI 279

PHRMSCI 197. Professional Internship. 1-4 Units.

Provides students with opportunity to develop leadership and professional skills necessary for competitive placement in their chosen industry. Students gain new and field-specific skills outside the classroom environment while participating in a supervised internship for a total of 100 hours.

Grading Option: Pass/Not Pass only

Repeatability: May be taken unlimited times

Restrictions: Seniors only.

PHRMSCI 198. Independent Study in Pharmaceutical Sciences. 1-4 Units.

Students interested in independent study should arrange with a faculty member to sponsor and supervise such work. A time commitment of three hours per week per unit is expected. A written report is required at the end of each quarter.

Repeatability: May be taken for credit for 4 units

PHRMSCI 199. Undergraduate Research. 1-4 Units.

Original research in the laboratory of Pharmaceutical Sciences faculty. Attendance at regular research group meetings is also generally expected, and a quarterly written report is required. Strongly recommended for students considering research careers and/or graduate degree programs.

Repeatability: May be taken unlimited times

PHRMSCI H199. Honors Research in Pharmaceutical Sciences. 1-4 Units.

Undergraduate honors research in Pharmaceutical Sciences. A student time commitment of 10-15 hours per week is required.

Repeatability: May be taken unlimited times

PHRMSCI 223. Biological Macromolecules. 4 Units.

Introduction to nucleic acid and protein structure, dynamics, and function. Topics include analytical methods, molecular evolution, folding, and catalysis. Same as CHEM 223

PHRMSCI 241. Advanced Topics in Pharmacology. 2 Units.

Application of pharmacological principles in disease therapy. Advanced pharmacological mechanisms and in-depth study of drug action. Discussion of several major drug classes/therapeutic strategies: molecular mechanisms of action, physiological consequences of administration, and clinical use.

PHRMSCI 242. Healthspan Sciences. 4 Units.

Covers the complex and multi-factorial process of aging and increases the understanding of factors that contribute to enhanced lifespan, including basic principles of health and wellness and scientifically proven interventions, both pharmacological and non-pharmacological.

Prerequisite: Recommended: Undergraduate courses in biochemistry, molecular biology, and basic physiology.

Concurrent: PHRMSCI 142

PHRMSCI 250A. Current Topics in Pharmaceutical Sciences. 1 Unit.

Intended to expose students to the primary literature and current research in the field of Pharmaceutical Sciences. Students analyze and present information for discussion. Guest speakers from academia and industry may participate throughout the quarter.

Grading Option: Satisfactory/Unsatisfactory only

Repeatability: May be taken for credit 3 times

Restrictions: Mathematical and Computational Biology majors only.

PHRMSCI 250B. Current Topics in Pharmaceutical Sciences. 1 Unit.

Intended to expose students to the primary literature and current research in the field of Pharmaceutical Sciences. Students analyze and present information for discussion. Guest speakers from academia and industry may participate throughout the quarter.

Prerequisite: PHRMSCI 250A with a minimum grade of B-.

Grading Option: Satisfactory/Unsatisfactory only

Repeatability: May be taken for credit 3 times

Restrictions: Mathematical and Computational Biology majors only.

PHRMSCI 250C. Current Topics in Pharmaceutical Sciences. 1 Unit.

Intended to expose students to the primary literature and current research in the field of Pharmaceutical Sciences. Students analyze and present information for discussion. Guest speakers from academia and industry may participate throughout the quarter.

Prerequisite: PHRMSCI 250B with a minimum grade of B-.

Grading Option: Satisfactory/Unsatisfactory only

Repeatability: May be taken for credit 3 times

Restrictions: Mathematical and Computational Biology majors only.

PHRMSCI 251. Experimental Pharmacology. 4 Units.

Introduction to the concepts and techniques used in pharmacological science. Molecular biology, quantitative and biochemical pharmacology, fluorescent probes, behavior, genetics, animal handling, anatomical and receptor binding analysis, methods for ion channel study, the absorption, distribution, metabolism, and elimination of drugs.

PHRMSCI 254. Introduction to Pharmacology. 4 Units.

Ligand-gated ion channels, G protein-coupled receptors, receptor tyrosine kinases, ligand-regulated transcription factors, their signaling mechanisms, trafficking, macromolecular complexes, and physiological responses.

PHRMSCI 255. Neuropharmacology. 2 Units.

Mechanisms underlying chemical signaling processes in the brain and periphery. Molecular biology, signal transduction, transmitter synthesis, and inactivation of major neurotransmitter systems. Drugs that act on these major neurotransmitters.

PHRMSCI 256. Experimental Design for Pharmacologists. 1 Unit.

Population and sample statistics, hypothesis testing, analysis of variance, nonparametric statistics, experimental design, power, and the use of statistical computer software.

Prerequisite: PHARM 251 with a minimum grade of B-.

PHRMSCI 257. Ethics in Research. 1 Unit.

Ethical conduct in research including data handling, authorship, conflict of interest, animal rights, handling of misconduct.

Prerequisite: PHARM 299 with a minimum grade of B-.

Repeatability: May be taken for credit 2 times

PHRMSCI 263. Pharmacogenomics and Epigenetics. 4 Units.

Survey of the genetic and epigenetic basis of inter-subject variability in response to drugs. Covers drug efficacy, safety, and the need for their optimization in pharmacotherapy. Emphasizes genetic mechanisms of polymorphisms in the pharmacokinetics and pharmacodynamics of representative therapeutic drugs.

Concurrent: PHRMSCI 163

PHRMSCI 272. Special Topics in Pharmaceutical Sciences. 2-4 Units.

Reserved for current topics of particular interest in areas of pharmaceutical sciences that are not covered by other courses. The subject will vary from year to year, highlighting, for example, significant emerging fields or highly specialized but vital research areas.

Repeatability: May be taken unlimited times as topics vary

PHRMSCI 275. Drug Discovery Computing Techniques. 4 Units.

Techniques used in computer-aided drug discovery, including theory behind these techniques and practical applications. Topics include scientific computing; python; classical force fields and simulations; visualization and movie-making; quantum mechanics in drug discovery; molecular dynamics; solvation models; and several others.

Concurrent: PHRMSCI 175

PHRMSCI 277. Medicinal Chemistry. 4 Units.

Fundamentals of medicinal chemistry covering diverse aspects of drug design, discovery, synthesis, and development. Molecular basis of drug action with an emphasis on the structure-to-function continuum.

PHRMSCI 279. Emerging Technologies in Pharmaceutical Sciences and Medicine. 4 Units.

Introduces emerging, ground-breaking technologies in pharmaceutical sciences and medicine, including pharmacogenomics, genome editing, and stem cell and engineered T cell therapies. Explores these novel technologies with both their underlying theories and forward-thinking applications.

Concurrent: PHRMSCI 179

PHRMSCI 298. Research Seminar . 2 Units.

Presentation and discussion of current problems and methods in teaching and research in pharmaceutical sciences.

Repeatability: May be taken unlimited times

PHRMSCI 299. Graduate Research. 1-12 Units.

Supervised original research or investigation under the direction of an individual faculty member.

Repeatability: May be taken unlimited times

PHRMSCI 399. University Teaching. 1-4 Units.

Limited to Teaching Assistants.

Grading Option: Satisfactory/Unsatisfactory only

Repeatability: May be taken unlimited times

Pharmacology Courses

PHARM 270. Applied Pharmacology . 2 Units.

Introduction to pharmacological techniques and current research problems; includes laboratory demonstrations and research seminars.

Restrictions: Pharmacology majors only.

PHARM 271. Principles of Pharmacology . 3 Units.

Principles of pharmacology: pharmacodynamics, pharmacokinetics, pharmacogenetics, drug interactions, and toxicity.

Restrictions: Pharmacology majors only.

PHARM 272. Receptors and Drug Targets . 3 Units.

Molecular basis of drug-receptor interaction. Receptor properties including gene and protein structure, signaling mechanisms, trafficking and physiological effects: G-protein linked receptors, ligand-gated ion channels, receptor tyrosine kinases, nuclear receptors, and ligand regulated transcription factors.

Restrictions: Pharmacology majors only.

PHARM 274. Research Techniques in Pharmacology. 3 Units.

Experimental techniques and model systems used in pharmacological research. Receptor analysis, bioassay, molecular biology, in vitro pharmacology, biochemical pharmacology, imaging, electrophysiology, in vivo pharmacology, disease models.

Restrictions: Pharmacology majors only.

PHARM 276. Experimental Design and Data Analysis . 3 Units.

Experimental design, data analysis and interpretation. Population and sample statistics, hypothesis testing, analysis of variance, nonparametric statistics, and power calculations.

Restrictions: Pharmacology majors only.

PHARM 277. Ethics in Scientific Research. 1.5 Units.

Ethical conduct in research including data handling, authorship, conflict of interest, animal rights, and handling of misconduct.

Restrictions: Pharmacology majors only.

PHARM 278. Concepts in Drug Discovery. 3 Units.

Critical steps involved in discovery and optimization of a new drug. Target selection, relationship of molecular structure to pharmacological activities, screening methods, strategies to identify lead compounds, and preclinical characterization necessary for development of the drug for clinical trials.

Restrictions: Pharmacology majors only.

PHARM 279A. Special Topics in Pharmacology I . 1.5 Units.

Topics of current interest in pharmacology; discussion of recent research publications.

Repeatability: May be taken 1 time as topics vary

Restrictions: Pharmacology majors only.

PHARM 279B. Special Topics in Pharmacology II. 3 Units.

Topics of current interest in pharmacology; discussion of recent research publications.

Repeatability: May be taken 1 time as topics vary

Restrictions: Pharmacology majors only.

PHARM 280. Master's Project in Pharmacology. 4 Units.

Capstone research paper on topic of interest in pharmacology.

Restrictions: Pharmacology majors only.

PHARM 281. Neuropharmacology . 3 Units.

Autonomic and central nervous system pharmacology, including major drug classes and therapeutic uses. Mechanisms underlying chemical signaling processes in the brain and peripheral nervous system, including neurotransmitter synthesis, inactivation, and receptor action.

Restrictions: Pharmacology majors only.

PHARM 282. Behavioral Pharmacology. 3 Units.

Pharmacology of integrative function and behavior. Drug treatment of pain. Mechanisms of reward, addiction, and drugs of abuse.

Restrictions: Pharmacology majors only.

PHARM 283. Cardiovascular Pharmacology. 3 Units.

Basic understanding of drugs used in the prevention and treatment of cardiovascular disease. Mechanisms of action, clinical and adverse effects.

Restrictions: Pharmacology majors only.

PHARM 284. Endocrine, Respiratory, and Gastrointestinal Pharmacology . 3 Units.

Basic understanding of drugs used in endocrine, respiratory, and gastrointestinal conditions, including hormone replacement, contraceptives, and drugs for diabetes, asthma, obesity, ulcer, and gastric reflux. Mechanisms of drug action, clinical and adverse effects.

Restrictions: Pharmacology majors only.

PHARM 298. Seminar. 2 Units.

Presentation and discussion of current problems and methods in teaching and research in pharmacology, toxicology, and therapeutics.

Repeatability: May be taken unlimited times

PHARM 299. Research. 1-12 Units.

Independent research with Pharmacology and Toxicology faculty.

Repeatability: May be taken unlimited times

Pharmacy Courses

PHMD 200A. Interprofessional Clinical Foundations I. 5 Units.

The first course in a four-part series that covers interprofessional patient communication, medical interviewing, physical examination, and health promotion. Direct instruction in professionalism, diversity, social determinants of health, kindness, mindfulness, well-being, epidemiology, and biostatistics.

Grading Option: Honors-Pass-Fail

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 200B. Interprofessional Clinical Foundations II. 2 Units.

The second course in four-part series that covers interprofessional communication, medical interviewing, physical examination, and health promotion.

Direct instruction in professionalism, diversity, social determinants of health, kindness, mindfulness, well-being, epidemiology, and biostatistics.

Grading Option: Honors-Pass-Fail

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 200C. Interprofessional Clinical Foundations III. 2 Units.

The third course in a four-part series that covers interprofessional communication, medical interviewing, physical examination, and health promotion.

Direct instruction in professionalism, diversity, social determinants of health, kindness, mindfulness, well-being, epidemiology, and biostatistics.

Grading Option: Honors-Pass-Fail

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 200D. Interprofessional Clinical Foundations IV. 2 Units.

The fourth course in a four-part series that covers interprofessional communication, medical interviewing, physical examination, and health promotion.

Direct instruction in professionalism, diversity, social determinants of health, kindness, mindfulness, well-being, epidemiology, and biostatistics.

Grading Option: Honors-Pass-Fail

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 201A. Principles of Pharmacy Practice I. 2 Units.

The first of a four-part series that covers the function and role of the health care team, Pharmacist Patient Care Process, immunization certification, communication and documentation, informatics, patient safety, interviewing, active listening, management/leadership, careers, resiliency, and student wellness.

Grading Option: Honors-Pass-Fail

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 201B. Principles of Pharmacy Practice II. 2 Units.

The second of a four-part series that covers the function and roles of the health care team, Pharmacist Patient Care Process, immunization certification, communication and documentation, informatics, patient safety, interviewing, active listening, management/leadership, careers, resiliency, and student wellness.

Grading Option: Honors-Pass-Fail

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 201C. Principles of Pharmacy Practice III. 2 Units.

The third of a four-part series that covers the function and role of the health care team, Pharmacist Patient Care Process, immunization certification, communication and documentation, informatics, patient safety, interviewing, active listening, management/leadership, careers, resiliency, and student wellness.

Grading Option: Honors-Pass-Fail

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 201D. Principles of Pharmacy Practice IV. 2 Units.

The fourth of a four-part series that covers the function and role of the health care team, Pharmacist Patient Care Process, immunization certification, communication and documentation, informatics, patient safety, interviewing, active listening, management/leadership, careers, resiliency, and student wellness.

Grading Option: Honors-Pass-Fail

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 202A. Self Care I: Conventional and Complementary. 2 Units.

Educates pharmacy students about healthy lifestyle choices, the importance of mental and physical health, and self-care. Provides students with methods and techniques for dealing with the stressors of a professional educational environment and life challenges.

Grading Option: Honors-Pass-Fail

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 202B. Self Care II: Conventional and Complementary. 2 Units.

The study of nonprescription products, complementary/alternative medicine, and non-pharmacological interventions for select self-treatable medical conditions commonly encountered by the pharmacist. Emphasis on the pharmacist's consultant role in product selection and non-pharmacological recommendations.

Grading Option: Honors-Pass-Fail

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 202C. Self Care III: Conventional and Complementary. 2 Units.

Relates to patients' ability to care for themselves with emphasis on the pharmacist's consultant role and continues to explore self-treatable medical conditions commonly encountered by pharmacists, including non-pharmacologic interventions, nonprescription medications, and complementary/alternative products to treat them.

Grading Option: Honors-Pass-Fail

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 203A. Pharmacotherapy Principles to Practice I: Cardiology and Respiratory. 8 Units.

Integrates principles of biomedical and pharmaceutical sciences with evidence-based traditional and non-traditional therapies for management and prevention of disease. Topics include clinical chemistry, clinical toxicology, interprofessional health care, and public health. Covers the cardiovascular and respiratory system.

Grading Option: Honors-Pass-Fail

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 203B. Pharmacotherapy Principles to Practice II: Gastrointestinal and Nutrition. 4 Units.

Integrates principles of biomedical and pharmaceutical sciences with evidence-based traditional and non-traditional therapies for management and prevention of disease. Topics include clinical chemistry, clinical toxicology, interprofessional health care, and public health. Covers the gastrointestinal system and nutrition topics.

Grading Option: Honors-Pass-Fail

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 203C. Pharmacotherapy - Principles to Practice III: Renal and Immunology. 7 Units.

Integrates principles of biomedical and pharmaceutical sciences with evidence-based traditional and non-traditional therapies for management and prevention of disease. Topics include clinical chemistry, clinical toxicology, interprofessional health care, and public health. Covers the renal and immune systems.

Grading Option: Honors-Pass-Fail

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 203D. Pharmacotherapy - Principles to Practice IV: Endocrine System. 7 Units.

Integrates principles of biomedical and pharmaceutical sciences with evidence-based traditional and non-traditional therapies for management and prevention of disease. Topics include clinical chemistry, clinical toxicology, interprofessional health care, and public health. Covers the endocrine system.

Grading Option: Honors-Pass-Fail

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 203E. Pharmacotherapy - Principles to Practice V: Infectious Disease. 6 Units.

Integrates principles of biomedical and pharmaceutical sciences with evidence-based traditional and non-traditional therapies for management and prevention of disease. Topics include clinical chemistry, clinical toxicology, interprofessional health care, and public health. Covers infectious disorders.

Grading Option: Honors-Pass-Fail

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 203F. Pharmacotherapy - Principles to Practice VI: Central Nervous System. 5 Units.

Integrates principles of biomedical and pharmaceutical sciences with evidence-based traditional and non-traditional therapies for management and prevention of disease. Topics include clinical chemistry, clinical toxicology, interprofessional health care, and public health. Covers the central nervous system.

Grading Option: Honors-Pass-Fail

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 203G. Pharmacotherapy - Principles to Practice VII: Hematology and Oncologic Disorders. 6 Units.

Integrates principles of biomedical and pharmaceutical sciences with evidence-based traditional and non-traditional therapies for management and prevention of disease. Topics include clinical chemistry, clinical toxicology, interprofessional health care, and public health. Covers hematology and oncologic disorders.

Grading Option: Honors-Pass-Fail

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 203H. Pharmacotherapy - Principles to Practice VIII: Special Populations and Special Topics. 5 Units.

Integrates principles of biomedical and pharmaceutical sciences with evidence-based traditional and non-traditional therapies for management and prevention of disease. Topics include clinical chemistry, clinical toxicology, interprofessional health care, and public health. Covers special populations, ophthalmology, and special topics.

Grading Option: Honors-Pass-Fail

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 204A. Information Analytics and Numeracy I: Biostatistics. 2 Units.

Exposure to basic statistics and techniques that are commonly found in the medical and pharmacy literature, covering descriptive and inferential statistics. Students learn to choose the most appropriate statistical parametric and non-parametric tests and interpret findings from the literature.

Grading Option: Honors-Pass-Fail

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 204B. Information Analytics and Numeracy II: Drug Information, Research Methods, and Literature Analysis. 3 Units.

Addresses development of knowledge, skills, and attitudes required for biomedical inquiry and discovery, including methods for data retrieval, analysis, interpretation, and synthesis.

Grading Option: Honors-Pass-Fail

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 204C. Information Analytics and Numeracy III: Epidemiology. 2 Units.

Covers distribution of disease and health in groups of people and the factors that influence the distribution, including evaluation of therapeutic and diagnostic treatments and delivery of health care services.

Grading Option: Honors-Pass-Fail

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 205A. Molecular Basis of Health and Disease I: Microbiology and Immunology. 3 Units.

Principles of medical microbiology, immunology, virology, and parasitology. Introduction to classification, morphology, and physiology of microorganisms, particularly those that cause human pathology - bacteria, viruses, fungi, protozoans, parasite, and worms - and the body's immune response.

Grading Option: Honors-Pass-Fail

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 205B. Molecular Basis of Health and Disease II: Microbiology and Immunology . 3 Units.

Principles of medical microbiology, immunology, virology, and parasitology. Introduction to classification, morphology, and physiology of microorganisms, particularly those that cause human pathology - bacteria, viruses, fungi, protozoans, parasite, and worms - and the body's immune response.

Grading Option: Honors-Pass-Fail

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 205C. Molecular Basis of Health and Disease III: Clinical Chemistry. 2 Units.

Emphasis on normal human physiology and pathology as it related to clinical chemistry and assessment of disease states with the context of the Pharmacist Patient Care Process. Alterations of clinical chemistry results due to drug therapy are covered.

Grading Option: Honors-Pass-Fail

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 210. Principles of Pharmacology. 3 Units.

Provides an overview of the basic principles of pharmacology, covering pharmacodynamics - effects of drugs on the body - and pharmacokinetics - the process by which a drug is absorbed, distributed, metabolized, and excreted by the body.

Grading Option: Honors-Pass-Fail

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 211. Principles of Public Health. 4 Units.

Covers the framework, principles, and core responsibilities of public health research and practice from multidisciplinary perspectives. It also provides the necessary foundation for further studies using crosscutting approaches essential for public health practice.

Overlaps with PUBHLTH 200.

Grading Option: Honors-Pass-Fail

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 212. Principles of Pharmacogenomics. 2 Units.

Walks students through the basics of genetics and genomics. Particular emphasis is placed on the use of genetics or genetic testing to assist in patient treatment regimens and evaluation of disease.

Grading Option: Honors-Pass-Fail

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 213. Pharmaceutical Biochemistry. 4 Units.

Topics include the biological, chemical and cellular roles of carbohydrates, lipids, proteins, nucleic acids, hormones, enzymes and vitamins. In addition, the chemical and cellular basis of digestion, intermediary metabolism, biological oxidation and metabolic antagonism are discussed.

Grading Option: Honors-Pass-Fail

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 214. Pharmacy Law and Ethics. 3 Units.

An introduction to California and federal legal requirements that impact pharmacy practice, emphasizing the legal and ethical principles applied by pharmacists in their decision-making. Explores approaches for resolving ethical dilemmas in patient care.

Grading Option: Honors-Pass-Fail

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 215. Health Policy and Pharmacoeconomics. 3 Units.

Introduces students to the organization, financing, and delivery of health care services in the U.S. The relationship of providers, patients, payers, etc., are analyzed. Management and research principles utilized to manage drug therapy are introduced.

Grading Option: Honors-Pass-Fail

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 216. Clinical Toxicology. 2 Units.

Fundamentals of pharmacology and mechanisms of action are reinforced and applied to learn the clinical effects of acute/chronic exposure derived from environmental, dietary, occupational and pharmaceutical sources. Students focus on information literacy skills and clinical management of poisonings.

Grading Option: Honors-Pass-Fail

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 220. Medical Physiology with Anatomic Correlates. 5 Units.

Concepts of physiology and mechanisms of body function at various levels of organization from cellular to organ systems. Emphasis on quantitative understanding of various body processes. Human anatomy is integrated with physiological concepts. Anatomic-physiologic relationships facilitated through virtual labs.

Grading Option: Honors-Pass-Fail

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 230. Cannabis Pharmacology and Therapeutics. 2 Units.

Provide knowledge about the cannabis plant and the derivative constituents. Introduce the scientific basis for development of cannabis-derived medicinal drug products. Provide evidence-based information to navigate the mass of cannabis information and counsel patients in its use and safety.

Grading Option: Satisfactory/Unsatisfactory only

Restrictions: Doctor of Pharmacy only.

PHMD 231. Anti-Aging Pharmacology. 2 Units.

Addresses why we age and what we can do about it. Introduces the five models of aging. Covers the major pathways of aging and drugs that have been demonstrated to extend lifespan in model systems.

Grading Option: Satisfactory/Unsatisfactory only

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 232. Pharmacotherapy Principle to Practice: Hematopoietic Stem Cell Transplantation and Cellular Therapy. 2 Units.

Integrates principles of biomedical and pharmaceutical sciences with evidence-based traditional and non-traditional therapies for management and prevention of disease in patients receiving hematopoietic stem cell transplantation and cellular therapies.

Grading Option: Satisfactory/Unsatisfactory only

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 240. Mental Health, Medications, and the Media. 2 Units.

Examines the portrayal of psychiatric disease states and psychoactive drugs through the lens of the media. Critically evaluate documentaries, movies, and television series that portray topics such as drug misuse, psychedelic use, and disease states.

Grading Option: Satisfactory/Unsatisfactory only

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 241. Travel Health. 2 Units.

Learn to provide effective pre-travel itinerary-based assessment, planning, and consultation related to vaccine-preventable diseases, prevention of other infectious and non-infectious travel-related diseases, and self-treatable conditions not requiring a diagnosis. Topics include yellow fever, malaria, altitude sickness, and emerging tropical diseases.

Grading Option: Satisfactory/Unsatisfactory only

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 242. Advanced Cardiology Pharmacotherapy. 2 Units.

Focuses on cardiology specialty topics such as arrhythmias, acute decompensated heart failure, cardiogenic shock, sudden cardiac arrest, advanced cardiovascular life support, and the pharmacist's role in Code Blue situations, medical devices for hemodynamic monitoring and cardiac support, and heart transplantation.

Grading Option: Satisfactory/Unsatisfactory only

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 250A. Managed Care Pharmacy I. 2 Units.

Introduction to the principles and practice of managed care pharmacy, including collection and synthesis of clinical data, assessment of economic data, and decision-making for a Pharmacy and Therapeutics Committee.

Grading Option: Satisfactory/Unsatisfactory only

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 260. Leadership and Management. 2 Units.

Provide an introduction to various leadership roles in the field of pharmacy, as well as management techniques to engage and inspire team building, cultivate a productive work environment, and develop future leaders in the industry.

Grading Option: Satisfactory/Unsatisfactory only

Restrictions: Doctor of Pharmacy only.

PHMD 261. Health Coaching and Wellness for Pharmacists. 2 Units.

Trains student pharmacists to use health coaching techniques to care for those with different clinical conditions and goals. Reviews adult learning theories and skills, such as motivational interviewing, as they apply to health coaching. Reviews elements of clinician wellness.

Grading Option: Satisfactory/Unsatisfactory only

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 262. Overcoming Healthcare Disparities in Pharmacy Practice. 2 Units.

Providing an understanding of the causes for healthcare disparities and then proposing pharmacy practice-based solutions for overcoming them. Engaging with community partners and healthcare professionals for real-world experiences.

Grading Option: Satisfactory/Unsatisfactory only

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 270. Introduction to Drug Development and Evaluation. 2 Units.

Introduces drug development fundamentals, including drug discovery, clinical trials, and regulatory approval. It covers the FDA's role in drug safety, formulation optimization, and introduces Physiologically Based Pharmacokinetic (PBPK) modeling for predicting drug behavior and enhancing trial efficiency.

Grading Option: Satisfactory/Unsatisfactory only

Restrictions: Doctor of Pharmacy only.

PHMD 274A. Pharmaceutics I. 4 Units.

The first in a foundational series designed to develop an understanding of the science behind drug formulation, mechanisms, pharmacokinetics and interconnections with the Pharmacist Patient Care Process.

Grading Option: Honors-Pass-Fail

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 274B. Pharmaceutics II. 5 Units.

The second course in a foundational series designed to develop an understanding of the science behind drug formulation, mechanisms, pharmacokinetics, and interconnections with the pharmacist patient care process. Topics include drug substances, dosage forms, and therapeutic effects. Includes laboratory.

Grading Option: Honors-Pass-Fail

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 274C. Pharmaceutics III. 4 Units.

The final course in a foundational series designed to develop an understanding of the science behind drug formulation, mechanisms, pharmacokinetics, and interconnections with the Pharmacist Patient Care Process.

Grading Option: Honors-Pass-Fail

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 277A. Medicinal Chemistry I. 4 Units.

Application of organic chemistry, biochemistry, molecular biology, physical chemistry, pharmacology, and physiology to understand the theory and mechanics of modern day medicinal chemistry. Topics include receptor-protein structure, dynamics, and interactions; drug development and design; and pharmacodynamics, and pharmacokinetics.

Grading Option: Honors-Pass-Fail

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 277B. Medicinal Chemistry II. 6 Units.

Walks students through medicinal chemistry, broadly defined. Students utilize the knowledge gained in organic chemistry, biochemistry, molecular biology, physical chemistry, pharmacology and physiology in an integrated fashion as applied to modern medicinal chemistry. Continuation of Medicinal Chemistry I.

Grading Option: Honors-Pass-Fail

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 280A. Scholarly Project I. 1 Unit.

Provides students an opportunity to develop independent thinking, with particular focus on maturing analytical skills. Students are encouraged to develop an independent project, with a mentor, to study pharmacy-related aspects of multiple areas. First phase identifies project focus.

Grading Option: Honors-Pass-Fail

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 280B. Scholarly Project II. 1 Unit.

Provides students an opportunity to develop independent thinking, with particular focus on maturing analytical skills. Students develop an independent project, with a mentor, to study pharmacy-related aspects of multiple areas. Phase 2 focuses on final evaluation of project.

Grading Option: Honors-Pass-Fail

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 281. Clinical Trial Design. 2 Units.

Provide the basic principles for design of randomized clinical trials; provide a foundation in clinical trial phases and design; and recognize key stakeholders in clinical trials.

Grading Option: Satisfactory/Unsatisfactory only

Restrictions: Doctor of Pharmacy only.

PHMD 290. Doctor of Pharmacy Epilogue. 2 Units.

Reinforces and assesses student pharmacist's performance on cumulative learning outcomes; pre-APPE and APPE knowledge, skills, and attitudes; entrustable professional activities; team- and practice-readiness; and to demonstrate that student pharmacists are achieving outcomes required by the ACPE.

Grading Option: Honors-Pass-Fail

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 298. Research Seminar . 2 Units.

Designed to engage students and expose them to seminar speakers that come to discuss research or case studies in pharmaceutical sciences and pharmacy.

Grading Option: Honors-Pass-Fail

Repeatability: May be taken unlimited times

Restrictions: Doctor of Pharmacy have the first consideration for enrollment.

PHMD 299. Independent Research. 1-4 Units.

Supervised investigation and study of topics relevant to the practice of pharmacy not covered in other courses. Intended to facilitate a small number of students performing a deeper dive into topics of particular interest to them.

Grading Option: Honors-Pass-Fail

Repeatability: May be taken unlimited times

Restrictions: Doctor of Pharmacy only.