



Doctor of Pharmacy Course Descriptions 2017-2018 August 2017

The core curriculum is delivered in four years over eight 15-week long semesters and covers a series of didactic Pharmaceutical and Biomedical Sciences (PBS) courses, Clinical and Administrative Sciences (CAS) courses, Practicums (PRC), Electives (ELC), and Introductory and Advanced Practice Experiences (IPPEs and APPEs).

Courses are listed below sequentially by number. Fall semester courses are identified by odd numbers, Spring semester courses by even numbers. First year courses are indicated by 600 series numbering, and so on through to the fourth year which are in the 900 series.

First professional year courses

PBS 601 - Cell and Molecular Biology and Biochemistry (5 credits)

The Cellular and Molecular Biology and Biochemistry course is designed to provide the pharmacy students with a fundamental understanding of current concepts of cellular and molecular biology, and human biochemistry. Students are provided an overview of eukaryotic carbohydrate, lipid and protein metabolism, cellular signal transduction, biomedical aspects of human nutrition, genetic regulation, the molecular basis of inherited genetic diseases and acquired diseases like cancer, principles of commonly used biotechnologies, drug targets screening, and biopharmaceutical products generation. (*Prerequisite courses: None*)

PBS 602 - Pathophysiology and Pharmacology I: Neuro & Psychiatric (6 credits)

This course introduces the basic mechanisms of pathophysiology and pharmacology, and then integrates these disciplines through the study of the etiology, pathogenesis, clinical manifestations, treatment and prevention of major neurologic, psychiatric, and neuroendocrine diseases/disorders. Following an introduction to normal tissue types and adaptive responses, the course will cover basic etiological and pathophysiological mechanisms; mechanisms of injury will be reviewed; the central and peripheral nervous systems (CNS & PNS) are reviewed, major CNS, PNS and neuroendocrine diseases and disorders are covered. Students will learn the mechanism(s) of action and common or serious adverse effects of pharmacological agents and identify appropriate pharmacological treatments or adjust pharmacotherapy in the face of adverse effects. In addition, each student team will research a topic in depth, including a systematic search of peer-reviewed literature, to develop and present a formal case study, given at a level appropriate for an audience of healthcare professionals. To promote information literacy, teams will use systematic PubMed searches using MESH terms to identify and incorporate current literature reviews, guidelines, or other advanced professional sources, and carefully cite the information and sources on their slides. (*Prerequisite courses: 601, 603*)

PBS 603 - Medicinal Chemistry & Physical Pharmacy (5 credits)

The course consists of four components: (1) drug structure-relationships, prediction of the physico-chemical properties of a drug, basic knowledge of the major pathways of drug metabolism and factors that can contribute to drug-drug interactions; (2) the solubility, metabolism and pharmacological activity/potency of drugs classes based on the contribution of their functional groups to their structures; (3) drug assay and the application of chemical and physico-chemical methods of analysis to pharmaceutical substances; (4) active constituents of natural medicines with emphasis on the top selling medicinal herbs. *(Prerequisite courses: None)*

PBS 604 - Pharmacokinetics (5 credits)

This course focuses on understanding and applying pharmacokinetic principles for optimizing drug dosage. It is divided in to three modules: (1) descriptive, quantitative, and pharmacokinetics of special population. Descriptive pharmacokinetics provides a basic introduction to the key pharmacokinetic principles; it enables the student to conceptualize principles such as drug bioavailability, distribution, clearance, and excretion; concepts of drug absorption, metabolism, protein binding, and pharmacokinetic drug interactions will be discussed as well. (2) Quantitative pharmacokinetics covers the mathematical aspects, including the calculation of pharmacokinetic parameters following drug administration and compartment modeling. (3) the process of using pharmacokinetic principles to optimize drug dose in individuals and in patients with altered physiology is covered last. *(Prerequisite course: 605)*

PBS 605 - Biopharmaceutics, Drug Delivery and Calculations (5 credits)

This course is designed to give students an appreciation of the formulation, manufacture, and testing of dosage forms as well as an understanding of the interactions between complex drug delivery systems and biological systems. The course covers all the basic dosage forms and drug delivery systems as well as the routes of administration, absorption, and bioavailability. The course will also cover pharmaceutical calculations and some elements of compounding. It presents an overview of drug quality control and regulation. *(Prerequisite course: None)*

CAS 606 - Biostatistics and Pharmacoepidemiology (3 credits)

This course is designed to introduce major concepts in biostatistics and pharmacoepidemiology. Students will develop the ability to interpret and critically evaluate medical literature and to identify findings that have implications for their practice. Emphasis will be placed on an examination of how observational study designs draw upon epidemiologic techniques to address drug effectiveness, safety, outcome assessment and regulatory decision making. Students will also acquire skills in applying statistical analysis concepts learned throughout this course with the use of common computer software. *(Prerequisite course: None)*

IPP 607 - Introduction to Pharmacy Practice (2 credits)

This didactic class prepares students for their IPPEs. It covers introductory and contemporary pharmacy issues, practice history, pharmacy organizations and medical terminology, and certificate programs as required by experiential practice experiences. Additionally, students will be introduced to pharmacy law and professionalism issues, and they will be provided with an opportunity to develop introductory knowledge of the top 100 dispensed prescription medications. *(Prerequisite course: None)*

CAS 608 - Self Care (4 credits)

Self-Care is an interactive course designed to introduce a systematic approach for evaluating a patient's self-care needs, including assessing, triaging and making appropriate treatment recommendations. This course also provides an introduction to over-the-counter medications used

for self-treating common medical conditions in the community setting. Students will be expected to understand how and why obtaining a comprehensive patient history are necessary to objectively recommend appropriate over-the-counter medications that are safe and effective. Students will begin to appreciate the role of a pharmacist and how educating and empowering patients is a cornerstone in community pharmacy practice. *(Prerequisite courses: 607, 609)*

PRC 609 - Longitudinal Practicum I (1 credit)

Longitudinal Practicum I is the first in a series of six practicums designed to provide students with the opportunity to practice essential skills, and use knowledge learned in didactic courses to build and develop these skills in a sequential and integrated way. Longitudinal I provides a hands-on introduction to bench-top pharmaceutical compounding and calculations. Practicum I will provide an overview of the value of compounded dosage forms, and their limitations and relationship to FDA-approved drugs. Some insight will be given to the use of compounding pharmacies for the preparation of clinical trial materials, and various compounded preparations will be made. This practicum involves three pre-lab sessions, four wet lab sessions and nine hours of calculation sessions. *(Prerequisite course: None)*

PRC 610 - Longitudinal Practicum II (1credit)

Using the sterile IV hood, Practicum II will provide students with a hands-on introduction to aseptic techniques, and personal safety measures. Patient counseling and interviewing skills will be introduced and practiced. In addition, students will learn how to conduct a physical assessment of patients, with a focus on smoking cessation, blood pressure monitoring, and blood glucose assessment. Students will get the opportunity to practice physical assessment techniques on a simulated patient. In addition, students will participate in an immunization certification program, and the concept of Medication Therapy Management (MTM) and SOAP notes will be introduced. Practicum II emphasizes oral presentation skills, and introduces key concepts such as leadership, professionalism, and ethics. *(Prerequisite courses: 607; 609)*

Second professional year courses

ELC 700 – Elective (I) (2 credits)

Students must choose one from a number of elective topics that will be offered during the spring semester of the P2 year. Topics vary each year.

PBS 701 - Pathophysiology and Pharmacology II: Cardiovascular, Diabetes, Thyroid (6 credits)

This course describes and evaluates underlying pathogenesis of major cardiovascular disorders and cardiovascular pharmacology. Upon completion of this course students gain an understanding of major cardiovascular disease states, drug targets based on understanding the pathophysiology, and the mechanism of action and adverse effects of drugs used to treat cardiovascular disorders. Selected topics include: hypertension, dyslipidemia, thrombosis, arrhythmia, ischemic heart diseases, heart failure, venous thromboembolism, peripheral arterial diseases, valvular disease and cardiovascular shocks. In addition, this course describes the pathophysiology of two of the endocrine glands: thyroid and pancreas. Students gain an understanding of underlying pathogenesis of hypothyroidism, hyperthyroidism and Diabetes Mellitus, and the mechanism of action and adverse effects of pharmacological classes and agents to treat these endocrine disorders. *(Prerequisite courses: 601, 602, 603, 604)*

CAS 702 - Communications (2 credits)

The course is designed to teach student pharmacists the skills and techniques necessary to have productive communication encounters with patients and healthcare professionals using verbal and non-verbal skills. Utilizing techniques that evolve around oral and written communication, the students will begin to develop the skills necessary to conduct effective patient interviewing/counseling encounters, initiate problem solving & conflict management techniques, and expand their awareness regarding cultural competence and health literacy. *(Prerequisite course: None)*

CAS 703 - Drug Literature Evaluation & Drug Information (3 credits)

This course will provide a systematic approach to drug information and literature evaluation to formulate and implement appropriate drug therapy decisions. This includes effective searching, retrieval, evaluation and dissemination of electronic and print resources. Students will utilize skills learned in this course to effectively communicate and tailor drug information at the appropriate level for providers, other health professionals, caregivers, patients and the public. Additionally, this course will provide introductory knowledge on the state of the art in pharmacy informatics and decision support systems needed to implement patient-centered care. Students will be able to define basic terminology used in health informatics and describe the benefits and current constraints in using information and communication technology in health care. *(Prerequisite course: 606)*

PBS 704 - Pathophysiology and Pharmacology III: Pulmonary/ Renal/GI/GU (6 credits)

In this course, students will learn to identify drug targets based upon an understanding of the pathophysiology of major diseases of the respiratory, renal, gastrointestinal, genitourinary, and endocrine systems. Students will learn to recognize the major disorders of these systems, the mechanism of action and adverse effects of pharmacological classes of drugs used in the treatment of these disorders. In addition, students will learn the alternative pharmacological agents for patients who exhibit significant adverse effects to existing pharmacological therapy of these disorders. *(Prerequisite course: 602)*

CAS 705 - Pharmacotherapy I: Neuro and Psychiatric (6 credits)

This course will focus on the clinical foundations of pharmacotherapy, integration of pathophysiological and pharmacological mechanisms, and the pharmacotherapeutic interventions used in the management of disorders that are specific to or have a high prevalence in psychiatry or neurology. *(Prerequisite course: 602; and must have taken or be concurrently enrolled in 709)*

CAS 706 - Pharmacotherapy II: CV/Diabetes/ Pulmonary (6 credits)

This course focuses on the development of highly skilled clinical pharmacists. Students are taught to integrate knowledge of therapeutic interventions with the pathophysiological and pharmacological mechanisms and patient specific data to optimally management cardiovascular, pulmonary, and endocrine disorders. Students will gain understanding of disease state management through the interpretation of case reports, laboratory findings, application of pharmacologic principles and evidence based guidelines. *(Prerequisite courses: 604, 701, 703, 705)*

IPP 707 - Introduction to Pharmacy Practice Experience (I) (4 credits)

This is a 150-hour experiential placement in a contemporary community pharmacy practice setting. Students work with a preceptor pharmacist after the completion of the P1 didactic year. The experience begins the development of community practice skills in this medication use setting, which include professional communication, pharmacy calculations, pharmacy ethics and law, and health promotion. *(Prerequisite courses: 607, 608)*

PRC 709 - Longitudinal Practicum III (2 credits)

The third in the series this Practicum will enable students to apply their knowledge of pharmacotherapy to clinical scenarios through the use of Objective Structured Clinical Exams (OSCEs) and debates. Basic laboratory elements will be introduced and skill sets related to conducting MTM/motivational interviewing will be further refined. Students will also have the opportunity to enhance their oral communication skills through patient counseling exercises and debates on topics related to psychiatry and/or neurology. Professionalism, including behaviors and attitudes that are consistent with being a health care professional, will be reinforced. *(Co-requisite course: concurrently enrolled in 705)*

PRC 710 - Longitudinal Practicum IV (2 credits)

This Practicum will provide students with an opportunity to develop and practice clinical skills through the assessment of case reports laboratory findings, pharmacologic principles and evidence based guidelines. Students will be exposed again to OSCE which were first introduced in Practicum III. Journal Clubs, MTM, SOAP Notes and Care Plans will all be revisited, using various cardiovascular, endocrinologic, and pulmonologic disease states as a platform. Students will learn to demonstrate clinical skills relevant to providing patient care in simulated learning activities with other health care professional students. Evidence-based patient case discussion and patient therapeutic treatment plan recitation will be developed throughout the practicum. Students will be expected to continue to demonstrate the professional skills, attitudes, and values necessary to enter a clinical service. *(Co-requisite course: concurrently enrolled in 706)*

Third professional year courses**ELC 800 - Elective (II) (2 credits)**

Students must choose one from a number of elective topics that will be offered during the fall semester of the P3 year. Topics vary each year.

CAS 801 - Pharmacy and the Health Care System (3 credits)

This course will introduce the major healthcare stakeholders and elucidate the manner by which their interests and interactions have shaped the current US healthcare financing and delivery system, and set the stage for healthcare reform. Students will learn how to use this information as a framework to identify existing and future healthcare needs, and develop potential pharmacist-driven initiatives to improve value and patient care in general. *(Prerequisite course: None)*

CAS 802 - Pharmacy Law and Ethics (3 credits)

This course is designed to prepare student pharmacists to evaluate through critical thinking and problem solving skills and techniques necessary to identify, analyze, and evaluate the legal and ethical issues pertaining to the practice of pharmacy. Upon completion, a student will have an understanding of requirements for preparing and dispensing medications in a manner compliant with pharmacy rules/regulations and laws, as well as preparing and maintaining records that respect a patient's privacy interests and comply with the law, along with an appreciation for a pharmacist's duty to avoid harm while practicing the profession within the allocation of health resources, patient autonomy, and interactions with other healthcare providers. *(Prerequisite course: 607)*

PBS 803 - Immunology and Rheumatology (4 credits)

The course will initially focus on an overview of innate and adaptive immunity as well as basic principles of cellular immunology. A special emphasis will then be placed on integrating the underlying pathophysiological and applicable pharmacological mechanisms, which can be used in

the intervention and management of immunological-based diseases. These disease states include: Rheumatoid Arthritis, Psoriasis, Crohn's Disease, Systemic Lupus Erythematosus, and Multiple Sclerosis. Other topics covered in the course include organ transplantation, vaccination for disease, immunodeficiency and AIDS, as well as interactions between the immune system and cancer. Students are provided with an overview of immunity, cells and proteins of the immune system, along with their specific roles and interactions in human disease. *(Prerequisite courses: 601, 603, 704)*

CAS 804 - Pharmacy Management and Economic Principles (3 credits)

The objective of this course is to provide an opportunity to pharmacy students to learn important management, organizational, accounting, entrepreneurial, and marketing skills that are useful for pharmacy practice. To provide optimum care and services as a healthcare professional, pharmacists should understand the basic principles of managerial, organizational, and financial management. On a day-to-day basis pharmacists have to deal with people, change, structural demands, and organizational behavior. Therefore, more emphasis will be given to planning, organization, motivation, control, and marketing as they relate to community and health-system pharmacy management. This course will also provide a basic introduction of pharmacoeconomic principles and its application to improve patient outcomes. Course material will provide the students with an understanding of the methods to choose a cost-effective drug therapy for patient populations in order to achieve quality clinical, economic and humanistic outcomes. A combination of classroom mini-lectures, class discussion, required readings, and in-class learning assignments will be used to facilitate the student's understanding of important concepts related to pharmacy management and pharmacoeconomics. *(Prerequisite course: 801)*

CAS 805 - Pharmacotherapy III: Renal/Gastrointestinal /Hematology/Oncology (6 credits)

This course covers several topics of pharmacotherapy as well as some ethical issues surrounding patient care. The student will need to integrate physiologic, pathophysiologic, pharmacologic, pharmacodynamic, pharmacokinetic, laboratory monitoring, and pharmacotherapeutic principles to assess and/or formulate disease specific pharmacotherapy care plans. The course will focus on optimizing drug therapy through the design, recommendation, implementation, monitoring, and modification of individualized pharmacotherapeutic plans using updated pharmacologic principles, clinical recommendations, and evidence based guidelines. *(Prerequisite courses: 704, 706)*

CAS 806 - Pharmacotherapy IV: Microbiology and Infectious Diseases (6 credits)

This course will cover the pathophysiology and treatment of bacterial, viral, and fungal infections, as well as the principles of antimicrobial regimen selection and antimicrobial prophylaxis. By the end of this course the student should be able to: identify the principles of the practice of infectious diseases, identify the impact of the use of antimicrobial agents on the population, describe basic properties of common pathogenic microorganisms, list pharmacological properties of selected antimicrobial agents, identify likely pathogens responsible for a particular infectious disease process, select first line and alternative antimicrobial agents for selected disease states, and identify appropriate actions to monitor for efficacy and toxicity. *(Prerequisite courses: 603, 604, 703, 803)*

IPP 807 - Introductory Pharmacy Practice Experience (II) (2 credits)

This is a 75-hour experiential rotation in a hospital pharmacy practice setting. Students work with a preceptor pharmacist preferably in the summer after the completion of the P2 didactic year. The experience covers institutional pharmacy management and medication distribution systems, while expanding the practice skills into areas such as medication safety, technology, patient communication, and collaborative practice. *(Prerequisite course: 707)*

IPP 808 - Introductory Pharmacy Practice Experience (III) (2 credits)

This is a 75-hour in a specialty pharmacy practice setting. Students work with a preceptor pharmacist preferably in the summer after the completion of the P2 didactic year. The experience expands the exposure of unique pharmacy practice areas and allows the student to begin to develop knowledge in practice areas such as, but not limited to, compounding, long term care, education, management, or research. *(Prerequisite course: 707)*

PRC 809 - Longitudinal Practicum V (2 credits)

This Practicum will provide students with practice of nutritional calculations, MTM review of cases using specific topics such as renal, gastroenterologic and oncologic disease from this semester's pharmacotherapeutic course. Students will be provided with an opportunity to participate in an Inter-Professional Education (IPE) Simulation exercise; and there will be team-based topic presentations to consolidate oral communication skills. Overall, students will be provided with sufficient exposure to learn and practice their skills in the area of leadership, MTM, patient care and inter-professional practice. *(Prerequisite course: 703; concurrently enrolled in 805)*

PRC 810 - Longitudinal Practicum VI (2 credits)

The sixth and final Practicum will help students consolidate their clinical skills and their understanding of the roles and responsibilities of the pharmacist in various practice settings. In particular, this longitudinal practicum will build on skills developed in previous didactic courses and practicums in order to optimize personal performance going into the Advanced Pharmacy Practice Experiences (APPEs). Emphasis will be placed on infectious disease case scenarios in this practicum. Throughout Practicum VI students will be exposed to simulations in community, hospital, and ambulatory care environments and reinforce their skills in prescription processing, order entry and evaluation, and disease state management. Students will also be exposed to patient case scenarios and tasked to assess, evaluate, and prioritize patient problems and provide appropriate treatment recommendations. *(Prerequisite courses: 604, 703, 803)*

Advanced Pharmacy Practice Experiences (6 credits each)

Collectively, APPEs provide students with the opportunity to hone the practice, skills, professional judgement, behaviors, attitudes, values, confidence and sense of personal and professional responsibility required for each student to practice independently and collaboratively in an inter-professional, team-based environment. *(Prerequisite courses: students must successfully complete all P1-P3 courses before commencing APPEs).*

APP 901: In the Community Pharmacy Practice APPE, the student will have an opportunity to practice contemporary pharmacy in a community setting, balancing the changing demands of the healthcare system with those of the retail market. Whether in the large chain or independent pharmacy, activities will include managing the prescription verification process, selecting over-the-counter products for patient-specific needs, patient counseling, and delivering medication therapy management services.

APP 902: Students in the Hospital/Health System APPE will apply knowledge of sterile technique, pharmaceutical calculations, pharmaceutical compounding, medication use evaluation and

pharmacokinetic monitoring in activities that enhance the safe and effective use of medications in the hospital environment.

APP 903: Students in the General Medicine APPE apply critical thinking skills and drug information knowledge to evaluate a patient's medical information, identify drug therapy problems, design therapeutic interventions, and communicate medication therapy recommendations to other healthcare providers.

APP 904: In the Ambulatory Care APPE, students apply drug knowledge and communication skills with both patients and other healthcare team members to formulate and implement pharmacotherapy care plans, including monitoring and follow-up to assure the best possible outcomes for their patients.

APP 905/6: In Specialty I and Specialty II, students are offered two Specialty APPEs to explore areas of interest and focus in pharmacy practice. Specialty APPE offered in the CNUCOP curriculum include (but are not limited to) Infectious Disease, Critical Care, Emergency Medicine, Geriatrics, Pediatrics, Academia, Management, Leadership, Compounding, Home Infusion and Long-term Care.

Please note: The College reserves the right to make changes to the program at any time

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