

## Pharm.D Curriculum

### Course Descriptions

#### Year 1:

#### Fall Semester

##### **PHRD 3000: Introduction to Pharmacy (2 Credits)**

The Introduction to Pharmacy course is a first year, two credit course that is completed within the first seven days of the pharmacy curriculum. During this time, first year pharmacy students are the only pharmacy students on campus and the focus of the course and the faculty is preparing the new students with everything they need to be successful in the pharmacy curriculum and profession. The course includes logistical items such as getting set up with computer access, electronic access to courses, the library and email, meeting all first year course directors, getting an overview of the courses, meeting fellow classmates and learning about the campus and school. The course also includes important introductions to the policies, procedures and resources associated with student life such as the academic advancement policies, the student ethics and conduct code and tutoring programs. One half day of the course is devoted to small group activities involving the first year health profession students from all disciplines on the campus (nursing, dental, medicine, physical therapy, etc) to begin their journey as part of interdisciplinary health care teams. Students have opportunities to learn about extracurricular pharmacy related activities such as involvement in any of the more than ten pharmacy profession, student governance or campus related organizations and activities. Finally, students obtain important information about their transition to becoming a part of the pharmacy profession by participating with members and staff of the Colorado State Board of Pharmacy and applying for their licensure as a practicing intern pharmacist. The course culminates in a formal White Coat Ceremony that welcomes and celebrates the students' entry into the profession. Family members and friends are invited to join this celebration and the welcome picnic that follows. (2 Credits)

##### **PHRD 3100: Professional Skills Development I (3 Credits)**

This one-semester course is the first in a five-semester longitudinal course sequence intended to develop a broad range of skills necessary for current and future pharmacy practice. It is designed to parallel the didactic portion of the curriculum, integrating and applying essential knowledge, skills and attitudes required for a successful professional career. It is formatted to prepare students for more complex patient case scenarios presented in Comprehensive Patient Care (in semester 6) and in pharmacy practice. (3 Credits)

### **PHRD 3200: Professional Career Development (1 Credit)**

The goal of this course is to introduce students to selected opportunities and issues related to professional careers in pharmacy. This course will therefore consist of a series of presentations by faculty and guest lecturers highlighting the multifaceted scope of contemporary pharmacy practice. These presentations will address practice and career opportunities as well as requirements, issues and challenges related to that professional area. These presentations will provide students with a basic, early perspective on various career options and alternative practice settings. (1 Credit)

### **PHRD 3300: Experiential Practice I (1 Credit)**

The objective of the four-year experiential program, in combination with all other courses in the curriculum, is to educate students to think and act as independent pharmacy practitioners. The primary strategy used in experiential training to achieve that objective is to give students increasing levels of responsibility for patient care throughout the program in a variety of practice settings. Students will encounter multiple and varied problems in all experiential courses and success in experiential training is largely measured by the way in which they demonstrate the characteristics of an independent learner in dealing with those problems. Preceptors are mentors responsible for coaching students rather than providing instruction. The benefit gained by each student from experiential education is directly related to the extent the student takes direct responsibility for her/his own learning. (1 Credit)

### **PHRD 3400: Pharmacy and Health Care I: Drug Information (1 Credit)**

This course is designed to introduce concepts and skills required to locate and interpret drug information literature and to respond to drug information requests in an efficient manner. Proficiency in utilization of these resources is a process. Outside practice on resources introduced will maximize the benefit received from this course. Skills introduced here will be an asset throughout your career. Course content will include the structure of the biomedical literature, an explanation of the hierarchy of medical literature and the process of systematic searching for drug information, basic evaluation skills of medical literature, and an understanding of the pharmacist's role and responsibilities as a provider of drug information. This course will coincide with Skills PHRD 3100. (1 Credit)

### **PHRD 3410: Public Health, Health Economics and Policy (2 Credits)**

Knowledge of key concepts of health care economics is essential for successful career development. The purpose of this course is to introduce students to these concepts, and to provide the background necessary for future courses concerning the structure and financing of health care, technology assessment, public health, and health policy. (2 Credits)

### **PHRD 3500: Pharmacy Law and Management (3 Credits)**

Legal and ethical issues in pharmacy practice are presented in this course in both lecture and discussion group formats. The course begins with an introduction to law, including the Constitution, the role of laws and regulations, the judicial system and process, and administrative agencies, with emphasis on regulation of business in general and pharmacy practice in particular. (3 Credits)

**PHRD 3600: Science Foundation I: Chemistry and Pharmaceutics (3 Credits)**

The main goal of this course is to relate general principles of chemistry and energetics (thermodynamics and kinetics) to drug stability and bioavailability, pharmacologic action, and interactions with biological macromolecules. (3 Credits)

**PHRD 3610: Science Foundation II: Biochemistry and Cell Functions (4 Credits)**

The goals of this course are to build a strong knowledge base in biochemistry and cell biology, link biochemical principles to cellular function, describe how various diseases and errors in metabolism relate to biochemical defects in the cell, examine how selected drug-biomolecule interactions result in altered cellular metabolism, and recognize the processes that regulate cell communication and homeostasis. At the completion of this course, students should have a strong knowledge base regarding these concepts and should be able to apply them to more advanced topics in pharmacy practice. (4 Credits)

**Spring Semester**

**PHRD 3150: Professional Skills Development II (3 Credits)**

This one-semester course is the second in a five-semester longitudinal course sequence intended to develop a broad range of skills necessary for current and future pharmacy practice. It is designed to parallel the didactic portion of the curriculum, integrating and applying essential knowledge, skills and attitudes required for a successful professional career. It is formatted to prepare students for more complex patient case scenarios presented in Comprehensive Patient Care (in semester 6). (3 Credits)

**PHRD 3350: Experiential Practice II (1 Credit)**

The objective of the four-year experiential program, in combination with all other courses in the curriculum, is to educate students to think and act as independent pharmacy practitioners. The primary strategy used in experiential training to achieve this objective is to expose students in various practice settings to multiple expected and unexpected problems. Success in experiential training is largely measured by the way in which students recognize, and think and act in response to these problems. (1 Credit)

**PHRD 3450: Pharmacy and Health Care II: US Health Care Systems (2 Credits)**

The goal of the course is to educate students about the complexities of the health care delivery system. With an increasing emphasis on prescription medications, now, more than ever, pharmacists are an integral part of the health care system. Subsequently they are required to understand what the optimal goals of the health care system, how it functions, who are the major stakeholders, how does it compare to other international systems and what are the role of pharmacists in this system. In addition, pharmacists need to be familiar with various terminology used in the current health care system as it relates to pricing of medications, structure of health care providers, models of health care delivery and the management of pharmaceutical benefits. (2 Credits)

**PHRD 3550: Health Care Ethics: Interdisciplinary (0.65 Credit)**

This course is the first of the two semester series in health care ethics. The course introduces students to key aspects of professional codes of ethics in addition to the identification of various ethical dimensions of health care. Moreover, the course introduces students to central values, principles and virtues and how they apply in professional practice with the help of group discussions. (0.65 Credit)

**PHRD 3650: Principles of Drug Action (4.5 Credits)**

This course aims to introduce the student to basic pharmacodynamic and pharmacokinetic determinants of drug action, drug interactions, and the genetic basis for inter-individual differences in drug efficacy and toxicity. In addition, comprehensive aspects of medicinal chemistry will be covered for a number of therapeutic categories of drug agents. (4.5 Credits)

**PHRD 3750: Integrated Organ Systems I: Physiology (4 Credits)**

This course introduces students to human physiology through a systematic study of the nervous, motor, cardiovascular, renal, endocrine and gastrointestinal systems. A dominant theme of this course is emphasis on the mechanisms involved in homeostasis and how various organ systems interact to maintain homeostasis. Integration of information in this course will enable the student to comprehend normal physiological function and the impact of disease processes or drug treatment on tissue and organ function. (4 Credits)

**PHRD 3760: Integrated Organ Systems II: Autonomics and Autacoids (3 Credits)**

The autonomic nervous system (ANS), autacoids and inflammatory mechanisms represent important regulators of homeostasis under physiological and pathophysiological conditions. Consequently, they impact many organ systems in the body. This course is intended to provide the student with an understanding of (i) the physiology and pathophysiology of the autonomic nervous system, the somatic nervous system, autacoids and cellular responses to injury, (ii) the mechanisms by which drugs influence these systems, and (iii) the therapeutic applications of drugs which influence or mimic these systems. (3 Credits)

**Year 2:**

**Fall Semester**

**PHRD 4100: Professional Skills Development III (3 Credits)**

This course is the third in a five-semester longitudinal course sequence intended to develop a broad range of skills necessary for current and future pharmacy practice. It is designed to parallel the didactic portion of the curriculum, integrating and applying essential knowledge, skills and attitudes required for a successful professional career. It is formatted to prepare students for more complex patient case scenarios presented in Comprehensive Patient Care (in semester 6) and in pharmacy practice. (3 Credits)

**PHRD 4200: Instructional Methods I (1 Credit)**

This course is designed to advance the teaching and professional presentation skills of participants and to improve the participants' understanding of study design. (1 Credit)

**PHRD 4300: Experiential Practice III (1 Credit)**

The objective of the four-year experiential program, in combination with all other courses in the curriculum, is to educate students to think and act as independent pharmacy practitioners. The primary strategy used in experiential training to achieve that objective is to give students increasing levels of responsibility for patient care throughout the program in a variety of practice settings. Students will encounter multiple and varied problems in all experiential courses and success in experiential training is largely measured by the way in which they demonstrate the characteristics of an independent learner in dealing with those problems. Preceptors are mentors responsible for coaching students rather than providing instruction. The benefit gained by each student from experiential education is directly related to the extent the student takes direct responsibility for her/his own learning. (1 Credit)

**PHRD 4400: Pharmacy and Health Care III: Biostatistics (2 Credits)**

This course is designed to introduce students to the quantitative methods most commonly used in applied clinical research and prepare them to interpret the results, and evaluate the appropriateness, of statistical analyses used in pharmacotherapy research studies. Content addressed includes the following areas: an overview of study designs in medical research, measurement, descriptive statistics and measures of risk, inferential statistics, hypothesis testing, and the use of common statistical techniques. More advanced methods (e.g., survival analysis, multivariate analysis, and meta-analysis) are introduced at a very basic level. (2 Credits)

**PHRD 4500: Health Care Ethics: Interdisciplinary (0.65 Credit)**

This course is the second of the two semester series in health care ethics. The course introduces students to key aspects of professional codes of ethics in addition to the identification of various ethical dimensions of health care. Moreover, the course introduces students to central values, principles and virtues and how they apply in professional practice with the help of group discussions. (0.65 Credit)

**PHRD 4600: Clinical Science Foundations (3 Credits)**

This course provides students with a more detailed understanding of selected topics that bridge the gap between basic and clinical sciences. This course is divided into two distinct sections: (i) Pharmacokinetics, which focuses on the application of basic principles of this discipline to the clinical use of pharmacological agents with the object of optimizing drug therapy and (ii) Toxicology, which provides a basis for understanding the mechanisms of toxicity common to a broad range of diseases. Together, these sections will provide students with foundation for the rational application of drug therapy in a variety of disease states. (3 Credits)

**PHRD 4700: Integrated Organ Systems III/IV: Renal, Cardiovascular (5 Credits)**

The Integrated Organ System (IOS) courses place a significant emphasis and focus on pharmacotherapy (the treatment of diseases with drugs). The emphasis of IOS III&IV is on the renal and cardiovascular systems and their associated chronic diseases. A fundamental understanding of these core systems is highly relevant because they are essential to many other diseases that are discussed in the Integrated Organ System curricular track. (5 Credits)

**PHRD 4720: Integrated Organ Systems V: Cardiopulmonary (4 Credits)**

The Integrated Organ Systems-V course is an eight-week lecture series designed to introduce the entry level Doctor of Pharmacy student to the pathophysiology, diagnosis, and therapeutic management of cardiovascular and pulmonary diseases. Concepts surrounding drug delivery, pharmaceuticals, and pharmacokinetics are also threaded throughout the course. (4 Credits)

**Spring Semester**

**PHRD 4150: Professional Skills Development IV (3 Credits)**

This is the fourth-semester course in a five-semester longitudinal course sequence intended to develop a broad range of skills necessary for current and future pharmacy practice. It is designed to parallel the didactic portion of the curriculum, integrating and applying essential knowledge, skills and attitudes required for a successful professional career. It is formatted to prepare students for more complex patient case scenarios presented in Comprehensive Patient Care (in semester 6). (3 Credits)

**PHRD 4250: Instructional Methods II (1 Credit)**

This course is intended to expand upon fundamentals learned in PHRD 4200 Instructional Methods I. It will reinforce the student's understanding of techniques that are used to develop and effectively present a relevant healthcare topic and prepare the student for future presentations and seminars. Students will be expected to (i) apply these techniques to an individual verbal presentation on a topic provided to them during PHRD 4200 Instructional Methods I, and (ii) utilize these techniques to self-assess and peer-evaluate other students regarding the individual presentation. (1 Credit)

**PHRD 4350: Experiential Practice IV (1 Credit)**

The objective of the four-year experiential program, in combination with all other courses in the curriculum, is to educate students to think and act as independent pharmacy practitioners. The primary strategy used in experiential training to achieve that objective is to give students increasing levels of responsibility for patient care throughout the program in a variety of practice settings. Students will encounter multiple and varied problems in all experiential courses and success in experiential training is largely measured by the way in which they demonstrate the characteristics of an independent learner in dealing with those problems. Preceptors are mentors responsible for coaching students rather than providing instruction. The benefit gained by each student from experiential education is directly related to the extent the student takes direct responsibility for her/his own learning. (1 Credit)

**PHRD 4450: Pharmacy and Health Care IV: Advanced Drug Information (1 Credit)**

This course is designed to introduce a variety of drug information related activities that pharmacists participate in during clinical practice in various settings. In addition, this course will build on previous drug information skills to advance competency in knowledge and evaluation of primary literature. Course content will include reviews of the following drug information related activities: FDA approval process and investigational drugs, the role of the Institutional Review Board, formulary management, medication use evaluation, medication safety, adverse drug reaction monitoring and literature evaluation. (1 Credit)

**PHRD 4750: Integrated Organ Systems VI: Immunology (4 Credits)**

This course covers the normal immune and hematopoietic systems, immunopharmacology and the pathophysiology of diseases that fall into two conceptually distinct, but often overlapping and inter-related areas – malignancies (cancers) of solid organ origin and diseases of the immune system, including hematologic malignancies, auto-immune disorders, and other immune dysfunctions. (4 Credits)

**PHRD 4760: Integrated Organ Systems VII: Gastrointestinal, Nutrition (2 Credits)**

This course is intended to provide the student with an understanding of (i) the functioning of nutrition and the gastrointestinal system in health and disease, (ii) the means by which drugs alter gastrointestinal function and gastrointestinal function alters drug disposition, (iii) the importance of drug chemical structure on pharmacological and therapeutic actions, and (iv) the therapeutic applications of nutrition and drugs that modify gastrointestinal function. (2 Credits)

**PHRD 4770: Integrated Organ Systems VIII: Central Nervous System (4 Credits)**

This course is intended to provide the student with an understanding of (i) the functioning of the central nervous system (CNS) in health and disease, (ii) the means by which drugs alter CNS function, (iii) the importance of drug chemical structure on pharmacological and therapeutic actions, and (iv) the therapeutic applications of drugs which modify CNS function. Emphasis in this class will be placed on CNS conditions that are amenable to drug therapy. (4 Credits)

**Year 3:**

**Fall Semester**

**PHRD 5100: Professional Skills Development V (3 Credits)**

This one-semester course is the fifth in a five-semester longitudinal course sequence intended to develop a broad range of skills necessary for current and future pharmacy practice. It is designed to parallel the didactic portion of the curriculum, integrating and applying essential knowledge, skills and attitudes required for a successful professional career. It is formatted as a transition course to prepare students for more complex patient case scenarios presented in Comprehensive Patient Care (in semester 6) and in pharmacy practice. (3 Credits)

**PHRD 5200: Seminar on Pharmacy Issues (1 Credit)**

This course will provide the Pharm.D. student with the opportunity to participate in a formal, weekly seminar series as speaker, self-evaluator, active audience member, and session coordinator. (1 Credit)

**PHRD 5300: Experiential Practice V (2 Credits)**

The objective of the four-year experiential program, in combination with all other courses in the curriculum, is to educate students to think and act as independent pharmacy practitioners. The primary strategy used in experiential training to achieve that objective is to give students increasing levels of responsibility for patient care throughout the program in a variety of practice settings. Students will encounter multiple and varied problems in all experiential courses and success in experiential training is largely measured by the way in which they demonstrate the characteristics of an independent learner in dealing with those problems. Preceptors are mentors responsible for coaching students rather than providing instruction. The benefit gained by each student from experiential education is directly related to the extent the student takes direct responsibility for her/his own learning. (2 Credits)

**PHRD 5400: Pharmacy and Health Care V: Pharmacoeconomics (2 Credits)**

This course will introduce the concepts of pharmacoeconomics in a manner that will build upon the student's previous exposure to evidence-based pharmacy practice, health economics and the structure and financing of the US health care system. In addition to the didactic portion of the course focused on pharmacoeconomics, this course will bring together the elements of the Pharmacy and Healthcare Track in a series of real-world lectures concerned with contemporary issues in the field of pharmacy. (2 Credits)

**PHRD 5700: Integrated Organ Systems IX: Endocrinology, Rheumatology (4 Credits)**

This course is divided into five sections: 1-diabetes; 2-diabetes complications; 3- dermatology, ophthalmology, and otics; 4-women's health; and 5- osteoporosis, thyroid, genitourinary and corticosteroids. Recent advances in pharmacotherapy, patient-specific management, and controversial issues will be emphasized. The course is designed to be augmented by Professional Skills Development and provide knowledge that serves as a foundation for future core courses and clinical rotations. (4 Credits)

**PHRD 5710: Integrated Organ Systems X: Infectious Diseases I (4 Credits)**

This course addresses the pharmacology, pharmacokinetics, pharmacodynamics and appropriate use of antimicrobial agents as well as the clinical management of infectious diseases of primarily bacterial etiology. Recent advances in pharmacotherapy, patient-specific management strategies, and controversial issues will be included and emphasized. The course is designed to augment Professional Skills Development and provide knowledge that serves as a foundation for future core courses and clinical rotations. (4 Credits)

**PHRD 5720: Integrated Organ Systems IX: Infectious Diseases II (3 Credits)**

This course is intended to provide the student with an understanding of (i) the biology of human pathogens, (ii) the role and mechanisms of various pathogens in causing infections, (iii) the functioning of the immune system in health and disease, and (iv) the therapeutic applications of antimicrobial agents in combating infections. Emphasis in this course will be placed on disease pathophysiology, rational selection of appropriate antimicrobial drug therapy, appropriate and monitoring of patients for drug efficacy and safety, and drug interactions. (3 Credits)

**Spring Semester**

**PHRD 5250: Seminar on Pharmacy Issues (1 Credit)**

This course will provide the Pharm.D. student the opportunity to participate in a formal, weekly seminar series as a speaker, self-evaluator, active member of the audience, and session coordinator. (1 Credit)

**PHRD 5350: Experiential Practice VI (2 Credits)**

The course will emphasize communication skills with non-pharmacist health care practitioners, primarily nurses and physicians. In addition, it will provide insight into the challenges faced by non-pharmacist health care practitioners in their patient care activities. In addition, it will stress active learning and will require students to contribute to patient care at their practice sites. Each preceptor will involve their student in activities to help them care for their patients. Each preceptor will decide the nature of those activities and, accordingly, activities will vary from site to site. (2 Credits)

**PHRD 5650: Comprehensive Patient Care (9 Credits)**

Comprehensive Patient Care is a Pass/Fail capstone course designed to lend continuity and cohesiveness to the entire curriculum, through integration and application of essential knowledge, skills and attitudes required for a successful professional career. In this course students will continue to develop a broad range of skills necessary for current and future pharmacy practice. Additionally, students will be expected to practice and refine a variety of skills through collaborative and individual activities. This course will be presented using clinical patient cases, and completion of skills and/or activities relevant to clinical pharmacy practice. This course has been designed to prepare students for P4 Advanced Pharmacy Practice Experiences (APPEs). PHRD 5650 is a prerequisite for P4 APPEs. (9 Credits)

**PHRD 58XX: Elective**

**PHRD 58XX: Elective**

**Year 4:**

**Fall Semester**

**PHRD 6XXX: Clerkship**

**PHRD 6XXX: Clerkship**

**PHRD 6XXX: Clerkship**

**Summer Session**

**PHRD 6XXX: Clerkship**

**Fall Semester**

**PHRD 6XXX: Clerkship**

**PHRD 6XXX: Clerkship**

**PHRD 6XXX: Clerkship**

**PHRD 6250: Drug Information Portfolio**

## **Electives**

### **PHRD 5850: Geriatric Pharmacotherapy (2 Credits)**

This course is intended to provide the student with an advanced understanding of pharmacotherapy in older adults as well as common medical, psychological, and social issues encountered when caring for older adults. It is also intended to provide students an introduction to interdisciplinary care and opportunities to further develop problem solving and communication skills. (2 Credits)

### **PHRD 5870: Pediatric Pharmacotherapy (2 Credits)**

This course will be offered to students interested in developing and fostering their knowledge and assessment of childhood diseases and pharmacotherapy. Clinical pharmacy specialists and staff from The Children's Hospital of Denver will teach this course. This course is intended to provide students with a more advanced understanding of both common and uncommon disease states in acutely and chronically ill children. An emphasis on pharmacotherapy as well as common medical, psychological, and social issues encountered when caring for pediatric patients will be discussed. (2 Credits)

### **PHRD 5875: Pharmacy Management (2 Credits)**

This course provides an introduction to the principles, skills, and issues important to the successful management of a pharmacy enterprise. Particular attention will be given to key business relationships; business planning; market analysis; forms of ownership; service offerings; competitive strategies; operational issues such as promotion and marketing, customer service, financial, inventory and human resource management, drug plan and reimbursement challenges; technology and informatics and professional advocacy to support pharmacy entrepreneurship.

### **PHRD 5885: Acute Care (2 Credits)**

This course will address the pharmacology and appropriate clinical use of agents used in the treatment of selected acute disorders found in hospitalized patients. The course will also focus on the comprehensive management of these acute disorders. Recent advances in pharmacotherapy, patient-specific management strategies, and controversial issues will be included and emphasized. The purpose of this course is to provide a more comprehensive and in-depth background in acute care pharmacotherapy for students interested in, or planning to practice in, the institutional setting in which acute care issues are more commonly encountered. (2 Credits)

### **PHRD 5895: Medical Spanish (2 Credits)**

This Beginning Medical Spanish course, tailored for pharmacy students, is an opportunity to become comfortable with conversational Spanish and medical vocabulary in various pharmaceutical contexts. Language learning is both academic and experiential. (2 Credits)