

DOCTOR OF PHARMACY PROFESSIONAL DEGREE PROGRAM

CURRICULUM

<u>Course Title</u>	<u>Credits</u>	<u>Prerequisite(s)</u>
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First Professional Year– Fall Semester

Structures & Functions in Therapeutics	2	<i>None</i>
Pharmacological Therapeutics 1	3	<i>None</i>
Drug Informatics	2	<i>None</i>
Pharmaceutical Calculations 1	2	<i>None</i>
Professional Practice Readiness 1	3	<i>None</i>
Pharmaceutical Chemistry 1	3	<i>None</i>
Applications for Pharmacy Practice 1	1	<i>None</i>
Professionalism Seminar	0	<i>None</i>

** Co-curricular Requirements for this academic year*

Total Credits	16	
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First Professional Year-- Spring Semester

Pharmacological Therapeutics 2	3	<i>None</i>
Pharmaceutical Chemistry 2	3	<i>None</i>
Pharmaceutical Care	3	<i>None</i>
Physicochemical Principles of Pharmacy	2	<i>None</i>
Pharmaceutical Calculations 2	2	<i>None</i>
Pharmaceutics	4	<i>None</i>
Applications for Pharmacy Practice 2	1	<i>None</i>

** Co-curricular Requirements for this academic year*

Total Credits	18	
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First Professional Year– Summer Semester

Introductory Pharmacy Practice Experience I Rotation (IPPE I)	4	<i>(Successful completion of all courses prior to IPPE I)</i>
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CURRICULUM

Course Title	Credits	Prerequisite(s)
<i>Second Professional Year– Fall Semester</i>		
Biostatistics /Research Methods	4	None
Biopharmaceutics	3	PC I & II, PT I & II, Pharmaceutics, Physico- chemical principles of pharmacy
IT 1 – Foundations of IT	3	All courses prior to IT 1
IT 2 – Cardiology/Crit. Care	3	None
IT Lab**	2	None
Pharmaceutical Compounding Lab	2	Pharmaceutics & Physico- chemical principles of pharmacy
Applications for Pharmacy Practice 3	1	None
Principles of Pharmacy Administration 1	2	None
Professionalism Seminar	0	None

* *Co-curricular Requirements for this academic year*

1. ** In order to take an IT Lab course in a semester, the corresponding IT Lecture course must either be a pre-requisite or co-requisite to the IT Lab course.

Total Credits **20**

Second Professional Year– Spring Semester

IT 3 – Infectious Disease/Antimicrobials	4	None
IT 4 – Bone, Joint and Immunology	2	None
IT Lab 2**	2	None
Pharm & Out Res	3	Biostatistics/Res Meth
Pharmacokinetics	4	Biopharm
Elective	3	See Elective Page
Applications for Pharmacy Practice 4	1	None

* *Co-curricular Requirements for this academic year*

** In order to take an IT Lab course in a semester, the corresponding IT Lecture course must either be a pre-requisite or co-requisite to the IT Lab course.

Total Credits **19**

Second Professional Year– Summer Semester

Introductory Pharmacy Practice Experience II Rotation <i>courses prior to IPPE II)</i>	4	<i>(Successful completion of all</i>
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CURRICULUM

Course Title	Credits	Prerequisite(s)
<i>Third Professional Year– Fall Semester</i>		
IT Lab 3***	2	None
Pharm Jurp	3	None
IT 5 – Oncology/Hem/Pain Palliative	3	None
IT 6 – Endocrine/GI/Renal	3	None
Health Care Ethics **	2	None
Elective	3	See Elective Page
Applications for Pharmacy Practice 5	1	None
Professionalism Seminar	0	None

* Co-curricular Requirements for this academic year

** Health Care Ethics can be taken either fall or spring

*** In order to take an IT Lab course in a semester, the corresponding IT Lecture course must either be a pre-requisite or co-requisite to the IT Lab course.

Total Credits	15/17
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Third Professional Year– Spring Semester

IT 7 – Neuro/Psych	3	None
IT 8 – Special Populations	3	None
IT Lab 4***	2	None
Principles of Pharmacy Administration 2	2	Pharm Administration 1
Professional Practice Readiness 2	3	None
Health Care Ethics**	2	None
Applications for Pharmacy Practice 6	1	None
Professionalism Seminar	0	None

* Co-curricular Requirements for this academic year

** Health Care Ethics can be taken either fall or spring

*** In order to take an IT Lab course in a semester, the corresponding IT Lecture course must either be a pre-requisite or co-requisite to the IT Lab course.

Total Credits	14/16
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Fourth Professional Year– Summer Semester

Advanced Pharmacy Practice Experience (APPE) I Rotation** <i>completion of all courses prior to APPE and other required assessments such as PCOA, Co-curricular activities)</i>	10 (Successful
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**Pass/Fail Grade Only

CURRICULUM

Course Title	Credits	Prerequisite(s)
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Fourth Professional Year– Fall Semester

APPE II**	15	
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** Co-curricular Requirements*

***Pass/Fail Grade Only*

Total Credits	15	
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Fourth Professional Year – Spring Semester

APPE III**	15	
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** Co-curricular Requirements*

***Pass/Fail Grade Only*

Total Credits	15	
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PROFESSIONAL ELECTIVE COURSES AND THEIR PREREQUISITES

Title	Pre-requisite(s)
<i>Fall Semester</i>	
Research in Pharmaceutical Sciences ³	<ul style="list-style-type: none"> - All Department of Pharmaceutical Sciences Courses in first-year (Fall and Spring) - Minimum Cumulative GPA 2.75 - Permission of the instructor
Research in Clinical and Administrative (Fall Pharmacy Sciences (CAPS))	<ul style="list-style-type: none"> -All Department of CAPS Courses in first year and Spring) - Minimum Cumulative GPA 2.75 - Permission of the instructor
Anions and Cations in Biological Systems	<ul style="list-style-type: none"> - Pharmaceutical Chemistry I - Pharmacological Therapeutics I
Emergency Preparedness Course	<ul style="list-style-type: none"> - None
New Informatics Technologies in Pharmacy	<ul style="list-style-type: none"> -None
Molecular Modeling	<ul style="list-style-type: none"> -None (<i>Coming Fall 2021</i>)
Organometallic Chemistry in Drug Synthesis	<ul style="list-style-type: none"> - Pharmaceutical Chemistry I and II (<i>Coming Fall 2021</i>)
<i>Spring Semester</i>	
Research in Pharmaceutical Sciences ³	<ul style="list-style-type: none"> - All Department of Pharmaceutical Sciences Courses in first-year (Fall & Spring) - Minimum Cumulative GPA 2.75 - Permission of the instructor
Research in Clinical and Administrative (Fall Pharmacy Sciences (CAPS)) ³	<ul style="list-style-type: none"> -All Department of CAPS Courses in first year and Spring) - Minimum Cumulative GPA 2.75 - Permission of the instructor
Global Leadership in Interprofessional Research Drugs & Elderly	<ul style="list-style-type: none"> - None - Pharmacological Therapeutics I - Biopharmaceutics
Herbal and Complementary Therapy	<ul style="list-style-type: none"> - Completion of all courses in the First-Year (Fall & Spring and second-year Fall
Pharmaceutical Law and Policy	<ul style="list-style-type: none"> - None

³This course is offered by several instructors, each with a different course number section (see Schedule of Course for instructors' names/sections). Enrollment may be limited. Therefore, you must obtain the instructor's written permission before registration, and you must register in the section assigned to this instructor.

COURSE DESCRIPTIONS

First Professional Year—Fall Semester

Structures and Functions in Therapeutics - 2 credits

This course is designed to provide the student with the fundamental knowledge of the general structure and function of the human body. A short introduction to basic cell structure, tissues, human development and physiological control mechanisms & membrane transport is given at the beginning of the course to help the student acquire a better understanding of human anatomy and physiology. Instruction using the systemic approach has been adopted for this course. This method provides a better correlation among the tissues and organs and their functions of a particular system and between the systems themselves. A systemic approach also promotes the understanding of structure and function of the human body. The lectures are designed to give the student fundamental and essential knowledge of the human body's various organ systems. Slide projections, power point presentations, computer simulations and lecture outlines are used as teaching aids in this course. Work in the laboratory provides students with the opportunity to study prosecuted cadaver materials, anatomical models and physiological applications. Students are further guided by printed laboratory organization and objectives.

Pharmacological Therapeutics I – 3 credits

The course deals with the study and application of physico-chemical properties and the relationship between chemical structure and pharmacological activities of organic medicinal agents of natural and synthetic origin.

Pharmaceutical Calculations I – 2 credits

This course is an introductory development course. Quantitative skills necessary for an understanding of the 37 basic and clinical pharmaceutical sciences will be explored. Various techniques necessary in pharmaceutical calculations employed by the pharmacist in formulation, compounding, manufacturing and dispensing of medications will be discussed. The course will also provide the student with the development of skills to recognize errors in prescribing in both oral and written medication orders, basic patient and professional staff communication and basic patient data collection skill. Commonly used equipment and pharmaceutical dosing devices available in a variety of simulated practice settings will be introduced.

Application for Pharmacy Practice I -1 credit

The course will be co-coordinated by clinical and basic science faculty, who will provide instruction utilizing both didactic and practical teaching modalities. The applications for pharmacy practice I course is the first in a longitudinal series of courses meant to fully integrate knowledge and skills acquired from each course running during the same semester. It aims to incorporate the entrustable professional activities (EPAs), which emphasize practical applications for being a clinical pharmacist, using interactive and case-based learning activities during scheduled 3-hour sessions. Students will learn the purpose of the material taught in each course as well as how that material may be applied in practice-based real-world scenarios.

Drug Informatics - 3 Credits

This course refers to the application of technology in the delivery of drug information services. Drug information services, in turn, include responding to drug information inquiries, conducting medication use evaluations and participating in medication quality assurance programs, such as; monitoring adverse drug reactions, drug and herbal product interactions, and medications errors. This course is intended to introduce

students to drug information skills required to deliver pharmaceutical care. Students will be trained to develop the skills to obtain information from various literature and reference sources to answer drug information questions efficiently. Techniques for researching and evaluating drug literature will be covered. Emphasis will be placed on systemic approaches to formulation of responses utilizing both verbal and written communication skills.

Professional Practice Readiness (PPR I) 3 Credits

This course utilizes principles of team building and case-based learning to develop student understanding of the practical aspects of contemporary pharmacy practice. Instructors will introduce students to the Pharmacist's Patient Care Process (PPCP), covering the first three steps in the five-step process. Emphasis will be placed on both the verbal and written communication skills needed to interact with a variety of patients and across health care disciplines. Heavy focus will be placed on navigating the outpatient pharmacy setting, which involves acquiring preliminary knowledge about prescription handling and inventory management, as well as applied knowledge of OTC products and the most utilized prescription drugs. In addition, students will learn patient-counseling techniques, and develop basic physical assessment and clinical writing skills.

Pharmaceutical Chemistry I- 3 Credits

The course deals with the study and application of physico-chemical properties and the relationship between chemical structure and pharmacological activities of organic medicinal agents of natural and synthetic origin.

First Professional Year—Spring Semester

Pharmaceutics - 4 Credits

The design of the course is based on the integration of the study of physicochemical principles of pharmacy with formulation and preparation of pharmaceutical dosage forms. The integration is done within each main class of pharmaceutical dosage forms. The study of the physicochemical principles of pharmacy serves as a prologue to the materials covered in each section. Then the application of the knowledge of the physicochemical principles of pharmacy to the rational formulation, preparation/compounding, quality control, stability, packaging and storage of pharmaceutical dosage forms follows directly after the study of the physicochemical principles for each module (i.e., each major class of dosage forms).

Pharmacological Therapeutics II - 3 Credits

This is a continuation of Pharmacological Therapeutics I. The course deals with the study and application of physico-chemical properties and the relationship between chemical structure and pharmacological activities of organic medicinal agents of natural and synthetic origin.

Pharmaceutical Chemistry II - 3 Credits

This is a continuation of Pharmaceutical Chemistry I. The course deals with the study and application of physico-chemical properties and the relationship between chemical structure and pharmacological activities of organic medicinal agents of natural and synthetic origin.

Physico-Chemical Principles of Pharmacy – 2 credits

Drug action is dependent on a range of physico-chemical principles. These relate not only to the drug substance, or active pharmaceutical ingredient, but also to the excipients used in the

production of the dosage form. An understanding of these physico-chemical principles affords a better understanding of drug action, and an appreciation of the factors that may influence such drug action. Course work and laboratory exercises relating to physico-chemical principles are not part of the pharmacy curriculum since the emphasis is on the clinical aspects. However, this course has been designed to provide a basic understanding of the factors involved. Various examples will be discussed during class time which may, in some instances, also include a laboratory demonstration. The latter affords students the opportunity to observe certain effects where physico-chemical principles play a role.

Pharmaceutical Care or Pharmacy Care – 3 credits

This course is an introductory development course. Quantitative skills necessary for an understanding of the 37 basic and clinical pharmaceutical sciences will be explored. Various techniques necessary in pharmaceutical calculations employed by the pharmacist in formulation, compounding, manufacturing and dispensing of medications will be discussed. The course will also provide the student with the development of skills to recognize errors in prescribing in both oral and written medication orders, basic patient and professional staff communication and basic patient data collection skill. Commonly used equipment and pharmaceutical dosing devices available in a variety of simulated practice settings will be introduced.

Application for Pharmacy Practice 2 -1 credit

This is a continuation of Application in Pharmacy Practice I course. The course will be co-ordinated by clinical and basic science faculty, who will provide instruction utilizing both didactic and practical teaching modalities. The applications for pharmacy practice I course is the first in a longitudinal series of courses meant to fully integrate knowledge and skills acquired from each course running during the same semester. It aims to incorporate the entrustable professional activities (EPAs), which emphasize practical applications for being a clinical pharmacist, using interactive and case-based learning activities during scheduled 3-hour sessions. Students will learn the purpose of the material taught in each course as well as how that material may be applied in practice-based real-world scenarios.

Pharmaceutical Calculations II – 2 credits

This course is the continuation of Pharmaceutical Calculation I course. Quantitative skills necessary for an understanding of the 37 basic and clinical pharmaceutical sciences will be explored. Various techniques necessary in pharmaceutical calculations employed by the pharmacist in formulation, compounding, manufacturing and dispensing of medications will be discussed. The course will also provide the student with the development of skills to recognize errors in prescribing in both oral and written medication orders, basic patient and professional staff communication and basic patient data collection skill. Commonly used equipment and pharmaceutical dosing devices available in a variety of simulated practice settings will be introduced.

First Professional Year—Summer Semester

Introductory Pharmacy Practice Experience I (-021) 4 Credits

The primary goal of Introductory Pharmacy Practice Experiences (IPPEs) is to provide the student with an opportunity to experience a broad range of pharmacy practice experiences early in the student's academic career. IPPEs are characterized by various assignments provided to students from their P1 through P3

including actual practice experiences in community and institutional settings. IPPE provides an introduction to the profession and continue in a progressive manner leading to entry into Advanced Pharmacy Practice Experiences (APPEs) that they will complete during the fourth professional year. *Prerequisite: Successful completion of all courses in the first professional year, the IPPE I Rotation, and Co-curricular Requirements.*

Second Professional Year—Fall Semester

Integrated Therapeutics 1 Foundations of Integrated Therapeutics (-326) 3 Credits

Module Content: Assessment of Therapy and Pharmaceutical Care, Interpretation of Clinical Laboratory Tests, Herbs and Nutritional Supplements, Anaphylaxis and Drug Allergies, Managing Acute Drug Toxicity & Clinical Toxicology, Delivering Culturally Competent Care, Acid-Base Disorders, Fluid and Electrolyte Disorders, Drug Interactions, Pharmacogenetics, Geriatrics, Obesity, and Pediatrics.

The course will be taught by the clinical faculty to provide instruction utilizing both didactic and practical experience sessions. The course is organized by organ systems of the human body and various diseases associated with them. Students will learn about the pathophysiology and pharmacotherapy of various disease states that health care practitioners (pharmacists) may encounter in their practice settings. Students will learn to make appropriate therapy choices, define goals of therapy, and learn to assess whether these goals are being achieved. Students will learn to create, implement and monitor pharmaceutical care plans. A goal of this course is to prepare students with the ability to render pharmaceutical care and participate successfully for the experiential program.

The course is structured in a modular format and complemented with Integrated Therapeutics Laboratory. In order for students to achieve the course goals and objectives, a variety of teaching methods will be applied. Students will participate in traditional lectures, small group discussions, and practical laboratories to reinforce didactic teachings and other learning accesses.

Integrated Therapeutics 2 Cardiovascular Disorders/Critical Care (-327) 3 Credits

Module Content: Hypertension, Heart Failure, Venous Thromboembolism, Hyperlipidemias, Ischemic Heart Disease, Arrhythmias, Pulmonary Arterial Hypertension, Myocardial Infarction, Shock, and Peripheral Vascular Disease.

The course is structured in a modular format and complemented with Integrative Therapeutics Laboratory with lectures, labs and onsite practice activities led by clinical faculty. In order for students to achieve the course goals and objectives, a variety of teaching methods will be applied. Students participate in traditional lectures, small group discussions, practical laboratory exercises, onsite senior shadowing with direct patient care activities, SOAP case write-ups, SOAP presentations and Oral exam to reinforce didactic teachings and overall student learning; however, the primary focus of the module is provided by traditional lectures.

The Cardiovascular Module engage students in learning about the pathophysiology and pharmacotherapy of various disease states that affect the heart and vasculature with an emphasis on addressing practical information relevant to the practice of pharmacy. Students will learn to make appropriate therapy choices, define goals of therapy, and learn to assess whether these goals

are being achieved. Students will learn to create, implement and monitor pharmaceutical care plans. A goal of this course is to introduce students to patient-specific cardiovascular disease state management and enhance their clinical skills.

Integrative Therapeutics Lab I complements the didactic Integrative Therapeutics I Cardiovascular Module course and facilitates the process of team building by making the basic knowledge taught in the didactic course “come alive” in structured case studies lab exercises. Thus, the didactic lecture material will be expanded, reinforced and made practical by the case-based learning method. Cases will cover material taught in prior semesters to ensure adequate understanding of both the basic sciences and clinical application of therapeutics. Practice skills on the key assessment parameters required for optimal pharmaceutical care of a patient will be enforced. Assessment skills covered in the lab are those needed to make effective drug therapy decisions or recommendations and monitor the patient’s response to drug therapy. These include interpretation of laboratory information, physical assessment, disease and drug monitoring, and case evaluation.

Integrated Therapeutics Laboratory I (-329) 4 Credits

Group facilitated discussion has been proven to be an aid in learning for students in health professions. Integrative Therapeutics Lab I is a separate course from the didactic Integrative Therapeutics I course and is not designed to prepare students to pass exams given as a requirement of Integrative Therapeutics I. The Lab is designed to facilitate the process of team building by making the basic knowledge taught in the didactic course “come alive” in structured case studies lab exercises. Thus, the didactic lecture material will be expanded, reinforced and made practical by the case-based learning method. Cases will cover material taught in prior semesters to ensure adequate understanding of both the basic sciences and clinical application of therapeutics. Practice skills on the key assessment parameters required for optimal pharmaceutical care of a patient will be enforced. Assessment skills covered in the lab are those needed to make effective drug therapy decisions or recommendations and monitor the patient’s response to drug therapy. These include interpretation of laboratory information, physical assessment, disease and drug monitoring, and case evaluation. *Prerequisite: None.*

Biopharmaceutics (-313) 3 Credits

This course discusses basic concepts in pharmacokinetics (kinetics of drug absorption, distribution and elimination); bioavailability (rate and extent of absorption); influence of physicochemical, formulation, physiologic and disease variables on pharmacokinetics and bioavailability; and rationale for drug and dosage selection and monitoring in patient care. *Prerequisites: Pharmaceutical Chemistry I&II, Pharmacological Therapeutics I&II, Pharmaceutics and Physico-chemical principles of pharmacy.*

Biostatistics/Research Methods (-316) 4 Credits

This course serves as an introduction to the principles of biostatistics, study design and analysis. Students will learn basic statistical methods using contemporary computer-based statistical packages, and the application of statistics to pharmacy-based research. The course will introduce students to the elements of scientific research, the scientific process, and the role of research in clinical practice and pharmaceutical care. After this course, students should be able to understand the key elements of the scientific process and study design, and the application of statistical analysis to this process. *Prerequisite: None.*

Pharmaceutical Compounding Laboratory (-336) 2 Credits

The application of the knowledge of Physico-chemical principles to the formulation, compounding, quality control and storage of pharmaceutical dosage forms. *Prerequisite: Pharmaceutics.*

Principles of Pharmacy Administration 1: 2 credits

This course is an expansive and in-depth Introduction to Pharmacy Administration. It facilitates the student's management and leadership training by introducing them to a comprehensive overview of management and leadership principles, concepts and practices in pharmacy-based environments. The course further addresses the economic, administrative, entrepreneurial, innovative and human resource aspects of pharmacy practice while furthering students' knowledge on details about the US Health Care System.

Application for Pharmacy Practice 3 -1 credit

This is a continuation of Application in Pharmacy Practice 2 course. The course will be coordinated by clinical and basic science faculty, who will provide instruction utilizing both didactic and practical teaching modalities. The applications for pharmacy practice 3 course is the third in a longitudinal series of courses meant to fully integrate knowledge and skills acquired from each course running during the same semester. It aims to incorporate the entrustable professional activities (EPAs), which emphasize practical applications for being a clinical pharmacist, using interactive and case-based learning activities during scheduled 3-hour sessions. Students will learn the purpose of the material taught in each course as well as how that material may be applied in practice-based real-world scenarios.

Second Professional Year—Spring Semester

Integrated Therapeutics 3: Infectious Diseases Principles and Pharmacotherapy 4 Credits

Module Content: Structure- Activity Relationship, Application of Pharmacokinetic – Pharmacodynamic (PK/PD) Principles, and Mechanisms of Action and Resistance for Each Class of Antimicrobial Agents. Appropriate Therapy for Community Acquired Infections Versus Hospital Acquired Infections, Recent Epidemiological Data from the Center for Disease Control and Prevention and Their Guidelines for Treatment, Preventive and Infection Control Measures, Defining the Goals of Infectious Disease Therapy, Selecting Appropriate Infectious Diseases Therapy from Among Available Choices, and Evaluating and Documenting Outcomes.

Integrated Therapeutics 4: Bone, Joint, and Dermatologic Disorders (-328) 2 Credits

Module Content: Connective Tissue Disorders, Osteoporosis, Gout / Hyperuricemia, Rheumatic disorders, Osteomyelitis/Septic Arthritis, Skin / Dermatotherapy, Drug Induced skin disorders, Acne/Psoriasis, Solid Organ Transplant –Heart, Solid Organ Transplant –Lung, Solid Organ Transplant -Liver, and Solid Organ Transplant -Kidney

Integrated Therapeutics Laboratory II (-338) 4 Credits

The Integrative Therapeutics (IT) Lab II modular formatted courses which are organized by organ systems. The IT Lab 3 and 4 courses are intended to provide the student with a review of prescription and non-prescription (OTC) medications and medical devices and health care products commonly encountered in pharmacy practice. The appropriate selection, rational use, therapeutic efficacy and issues, warnings, precautions, contraindications, drug interactions, use in pregnancy

and lactation of prescription and non-prescription medications will be studied. In addition, an emphasis will be placed on counseling patients on the selection and proper use of non-prescription (OTC) medications and devices. The course will provide students with opportunities for increasing their problem-solving skills through the use of a modified problem-based learning approach. Students are scheduled to attend two large group sessions each week. *Prerequisite: None*

Pharmacoepidemiology & Outcomes Research (-323) 3 Credits

The Pharmacoepidemiology and Outcomes Research section is an introduction to the evaluation of the scientific studies that supports the rational use of medication use in humans. The goals of this block is to provide opportunities for students to understand the concepts, methods, and applications of epidemiology, pharmacoconomics, and outcomes studies utilized in clinical settings as well as with to provide tools to critically assess the clinical literature. In addition, the methods for the interpretational and generalization of findings from these studies relevant to medical and pharmaceutical care practice will be introduced by utilizing knowledge developed from the Research Methods/Biostatistics block. Students will be also prepared for problem-based critique sessions in the Integrative Therapeutics blocks. *Prerequisite: Biostatistics/ Research Methods.*

Pharmacokinetics (-314) 4 Credits

At the end of the course, the student should have acquired competency in the selection, design and adjustment of drug dosing regimens to optimize patient therapy on the basis of the patient's age and disease condition and the drug's pharmacokinetic and pharmacodynamic properties. Special emphasis is placed on those drugs with narrow therapeutic windows, which require therapeutic monitoring. *Prerequisites: Biopharmaceutics*

Application for Pharmacy Practice 4 -1 credit

This is a continuation of Application in Pharmacy Practice 3 course. The course will be coordinated by clinical and basic science faculty, who will provide instruction utilizing both didactic and practical teaching modalities. The applications for pharmacy practice 4 course is the fourth in a longitudinal series of courses meant to fully integrate knowledge and skills acquired from each course running during the same semester. It aims to incorporate the entrustable professional activities (EPAs), which emphasize practical applications for being a clinical pharmacist, using interactive and case-based learning activities during scheduled 3-hour sessions. Students will learn the purpose of the material taught in each course as well as how that material may be applied in practice-based real-world scenarios.

Second Professional Year—Summer Semester

Introductory Pharmacy Practice Experience II (-022) 4 Credit

The primary goal of Introductory Pharmacy Practice Experiences (IPPEs) is to provide the student with an opportunity to experience a broad range of pharmacy practice experiences early in the student's academic career. IPPEs are characterized by various assignments provided to students from their P1 through P3 including actual practice experiences in community and institutional settings. IPPE provides an introduction to the profession and continue in a progressive manner leading to entry into Advanced Pharmacy Practice Experiences (APPEs) that they will complete during the fourth professional year. *Prerequisite: Successful completion of all courses in the first professional year, the IPPE II Rotation, and Co-curricular Requirements.*

Third Professional Year—Fall Semester

Health Care Ethics* - 2 Credits

This course introduces students to ethical and to bioethical issues confronting healthcare providers within the practice setting. The course introduces students to how ethical theory and principles work to critically analyze and construct well concerned responses to ethical dilemmas. By utilizing the Beaubeu Grid method to collect and analyze case information students will refine their critical thinking skills (both verbal and written) as they read, write, discuss, and resolve the case material presented in class. Emphasis on collaborative dialogue between and among the disciplines represents the hallmark of this course. Finally, the course will familiarize students with ethical and legal considerations, patient-provider relationships, professionalism, and the concepts of moral reasoning. *Prerequisites:*

Integrated Therapeutics 5: Hematology/Oncology/Pain Palliative - 3 Credits

Module Content: Neoplastic Disorder: General Principles and Pathophysiology, Principles of Drug Therapy, Acute Myelogenous Leukemia & Acute Lymphocytic Leukemia, Chronic Myelogenous Leukemia & Chronic Lymphocytic Leukemia, Breast Cancer, Lung Cancer, Ovarian and Cervical Cancer, Bone Marrow Transplantation, Prostate Cancer, Acute and Chronic Pain Therapeutics, Lymphomas, Colorectal Cancer, Anemias, Hemoglobinopathies, Renal Cancer, Supportive Care, Death and Dying,

Integrated Therapeutics 6: Endocrine/GI/Renal - 3 Credits

Module Content: Diabetes Mellitus, Thyroid Diseases, Adrenal Diseases, Pituitary Gland Disorders, Acute and Chronic Renal Failure, Dialysis and Drug Loss Issues, Alcoholic Cirrhosis, Portal Hypertension, Drug-Induces Liver Disease, Hepatitis, Peptic Ulcer Disease / Zollinger-Ellison Syndrome, Gastroesophageal Reflux Disease, Stress-Related Gastrointestinal; Bleeding, Infectious Gastritis / Pancreatitis, Disorders of the GI Systems: Cholecystitis, Appendicitis, Diverticulitis, Hemorrhoids, Peritonitis, Nausea and Vomiting, Constipation and Diarrhea, Irritable Bowel Syndrome, Inflammatory Bowel Diseases (Ulcerative Colitis and Crohn's Disease), and Nutrition (parenteral / Enteral/ Pediatric).

Integrated Therapeutics Laboratory III (-338) 4 Credits

The Integrative Therapeutics (IT) Lab III modular formatted courses which are organized by organ systems. The IT Lab 5 and 6 courses are intended to provide the student with a review of prescription and non-prescription (OTC) medications and medical devices, and health care products commonly encountered in pharmacy practice. The appropriate selection, rational use, therapeutic efficacy and issues, warnings, precautions, contraindications, drug interactions, use in pregnancy and lactation of prescription and non-prescription medications will be studied. In addition, an emphasis will be placed on counseling patients on the selection and proper use of non-prescription (OTC) medications and devices. The course will provide students with opportunities for increasing their problem-solving skills through the use of a modified problem-based learning approach. Students are scheduled to attend two large group sessions each week. *Prerequisite:* None

Pharmaceutical Jurisprudence - 2 Credits

The course involves an examination of the laws and regulatory issues pertaining to the practice of pharmacy. Specifically, the course will focus on pertinent sections of the Federal Controlled

Substances Act, Food Drug and Cosmetic Act, as well as an overview of the state board of pharmacy acts and rules governing Virginia, Maryland, and the District of Columbia. *Prerequisite: None.*

Application for Pharmacy Practice 5 -1 credit

This is a continuation of Application in Pharmacy Practice 4 course. The course will be coordinated by clinical and basic science faculty, who will provide instruction utilizing both didactic and practical teaching modalities. The applications for pharmacy practice 5 course is the fifth in a longitudinal series of courses meant to fully integrate knowledge and skills acquired from each course running during the same semester. It aims to incorporate the entrustable professional activities (EPAs), which emphasize practical applications for being a clinical pharmacist, using interactive and case-based learning activities during scheduled 3-hour sessions. Students will learn the purpose of the material taught in each course as well as how that material may be applied in practice-based real-world scenarios.

** Health Care Ethics and Recitation is a required interdisciplinary course. Students are required to enroll in this course either in the fall or spring semester of the 3rd professional year. It is taught on Wednesdays from 5:00 p.m. to 7:00 p.m.*

Third Professional Year—Spring Semester

Health Care Ethics* - 2 Credits

This course introduces students to ethical and to bioethical issues confronting healthcare providers within the practice setting. The course introduces students to how ethical theory and principles work to critically analyze and construct well concerned responses to ethical dilemmas. By utilizing the Beaubeu Grid method to collect and analyze case information students will refine their critical thinking skills (both verbal and written) as they read, write, discuss, and resolve the case material presented in class. Emphasis on collaborative dialogue between and among the disciplines represents the hallmark of this course. Finally, the course will familiarize students with ethical and legal considerations, patient-provider relationships, professionalism, and the concepts of moral reasoning. *Prerequisites: None*

Integrated Therapeutics 7: Psychiatry and Neurology - 3 Credits

Module Content: Substance Abuse Disorders, Anxiety Disorders, Dementia – Alzheimer’s Disease / Vascular Dementias, Parkinson’s Disease, major Depressive Disorders / Bipolar Disorders, Seizure Disorders, Withdrawal Syndromes, Headache, Schizophrenia and Psychotic Disorders, Neuropathic Pain, Fibromyalgia, Ischemic Stroke, ADHD / Tourette’s Syndrome/ Enuresis, Sleep Disorders, and Multiple Sclerosis.

Integrated Therapeutics 8: Special Populations - 3 Credits

Module Content: Review of Pulmonary System / Drug Induced Pulmonary Disease, Respiratory Distress Syndromes / Ventilator Functions, Asthma, COPD, Cystic Fibrosis, Review of ENT System: Allergic Rhinitis / Sinusitis, Acute Bronchitis, and Common Cold, Urinary Incontinence, Women’s Health – Hormone Therapy, Women’s Health – Contraception, Women’s Health – Infertility & Endometriosis, Women’s Health – Pregnancy and Lactation, Men’s Health – Erectile Dysfunction, and Ear and Eye Disorders.

Integrated Therapeutics Laboratory 4 - 4 Credits

The Integrative Therapeutics (IT) Lab 7 and 8 are modular formatted courses which are organized by organ systems. The IT Lab 4 courses are intended to provide the student with a review of prescription and non-prescription (OTC) medications and medical devices, and health care products commonly encountered in pharmacy practice. The appropriate selection, rational use, therapeutic efficacy and issues, warnings, precautions, contraindications, drug interactions, use in pregnancy and lactation of prescription and non-prescription medications will be studied. In addition, an emphasis will be placed on counseling patients on the selection and proper use of non-prescription (OTC) medications and devices. The course will provide students with opportunities for increasing their problem-solving skills through the use of a modified problem-based learning approach. Students are scheduled to attend two large group sessions each week. *Prerequisite: None.*

Professional Practice Readiness (PPR II)

This course is designed to assess the skills of 3rd-year pharmacy students using an active learning format. All five steps of the Pharmacist's Patient Care Process (PPCP) will be covered, and students must demonstrate, through fulfillment of the ACPE-derived core competencies, mastery of the pre-APPE domains. As an addendum to the course, students are expected to complete structured patient care activities (MTM) at designated sites that will enhance knowledge and skills in care delivery. Students will also be required to complete at least 1 encounter related to inter-professional education (IPE).

Application for Pharmacy Practice 6 -1 credit

This is a continuation of Application in Pharmacy Practice 5 course. The course will be co-coordinated by clinical and basic science faculty, who will provide instruction utilizing both didactic and practical teaching modalities. The applications for pharmacy practice 6 course is the sixth in a longitudinal series of courses meant to fully integrate knowledge and skills acquired from each course running during the same semester. It aims to incorporate the entrustable professional activities (EPAs), which emphasize practical applications for being a clinical pharmacist, using interactive and case-based learning activities during scheduled 3-hour sessions. Students will learn the purpose of the material taught in each course as well as how that material may be applied in practice-based real-world scenarios.

Principles of Pharmacy Administration 2: 2 credits

This course is an expansive and in-depth application of the materials taught in Principles of Pharmacy Administration 1. It facilitates the student's application of management and leadership training using case-based approaches and projects to develop and master techniques learned in Principles of Pharmacy Administration 1. The course further addresses the economic, administrative, entrepreneurial, innovative and human resource aspects of pharmacy practice in the context of the US Health Care System from a pharmacist perspective. *Prerequisite: Principles of Pharmacy Administration 1*

* Health Care Ethics and Recitation is a *required* interdisciplinary course. Students are required to enroll in this course either in the fall or spring semester of the 3rd professional year. It is taught on Wednesdays from 5:00 p.m. to 7:00 p.m.

Third Professional Year—Summer Semester

Advanced Pharmacy Practice Experience I (-420) 10 Credits

The pharmacy practice clerkships are college-coordinated experience-based integrated problem-solving courses designed to help the student become an active participant in providing pharmacy services. The student, under the direction of different preceptors will learn to provide pharmaceutical care in cooperation with patients, prescribers and other members of an inter-professional health care team based on sound therapeutic principles and evidence-based data. This will take into account all relevant legal, ethical, social, economic and professional issues, emerging technologies and evolving pharmaceutical, biomedical, socio-behavioral and clinical sciences that may impact therapeutic outcomes. *Prerequisites: Successful completion of all courses up to, and including, the third year; attaining a minimum cumulative GPA of 2.50; co-curricular requirements, and the successful completion of PCOA*

Fourth Professional Year—Fall Semester

Advanced Pharmacy Practice Experience II (-421) 15 Credits

The pharmacy practice clerkships are college-coordinated experience-based integrated problem-solving courses designed to help the student become an active participant in providing pharmacy services. The student, under the direction of different preceptors will learn to provide pharmaceutical care in cooperation with patients, prescribers and other members of an inter-professional health care team based on sound therapeutic principles and evidence-based data. This will take into account all relevant legal, ethical, social, economic and professional issues, emerging technologies and evolving pharmaceutical, biomedical, socio-behavioral and clinical sciences that may impact therapeutic outcomes. *Prerequisites: Successful completion of all courses up to, and including, the third year; attaining a minimum cumulative GPA of 2.50.*

Fourth Professional Year—Spring Semester

Advanced Pharmacy Practice Experience III (-422) 15 Credits

The pharmacy practice clerkships are college-coordinated experience-based integrated problem-solving courses designed to help the student become an active participant in providing pharmacy services. The student, under the direction of different preceptors will learn to provide pharmaceutical care in cooperation with patients, prescribers and other members of an inter-professional health care team based on sound therapeutic principles and evidence-based data. This will take into account all relevant legal, ethical, social, economic and professional issues, emerging technologies and evolving pharmaceutical, biomedical, socio-behavioral and clinical sciences that may impact therapeutic outcomes. *Prerequisites: Successful completion of all courses up to, and including, the third year; and attaining a minimum cumulative GPA of 2.50.*

Electives (Fall)**

Research in Clinical Administrative Pharmacy Sciences (-302) 3 Credits each

The course deals with an introduction to techniques and methodologies in clinical pharmacy research. Emphasis on literature retrieval, design/conduct of experiments on a specific problem, drug therapy clinical studies or pharmacy administration topics, and analysis and interpretation

of data for a written report. *Prerequisites: Minimum cumulative GPA of 2.75 and permission of the instructor.*

Research in Pharmaceutical Sciences (-302) 3 Credits each

The course deals with an introduction to techniques and methodologies in pharmaceutical sciences research. Emphasis on literature retrieval, design/conduct of experiments on a specific problem, analysis and interpretation of data for a written report. *Prerequisites: All Department of Pharmaceutical Sciences Courses in the first year (fall and spring); minimum cumulative GPA of 2.75; and, permission of the instructor.*

Anions and Cations in Biological Systems (-320) 3 Credits

The course deals with the study and application of physico-chemical properties and the relationship between chemical structure and pharmacological activities of inorganic medicinal agents. *Prerequisites: Pharmaceutical Chemistry I and Pharmacological Therapeutics I.*

Emergency Preparedness Course - 3 Credits

The purpose of this course is to train health care professional students on their role in preparing citizens to be better prepared to respond to emergencies in their communities. This course will train students to provide critical support to first responders, immediate assistance to victims and help organize spontaneous volunteers at a disaster site. Lastly students will learn how to coordinate outreach efforts to improve community resilience. Completion of this course will help meet the training requirements to be a volunteer for the Capitol City Pharmacy MRC.

Molecular Modeling – 3 credits

The course includes 4 units teachings on computational chemistry, molecular modeling, elements of chemoinformatics, and drug design and discovery.

Organometallic Chemistry in Drug Synthesis – 3 Credits

This course is designed to introduce the students to the advanced concepts of organometallic chemistry and its applications towards the synthesis of biologically interesting compounds, such as drugs and drug-like molecules. The course will emphasize the underlying principles of reactivity, transition state analysis, name reactions and applications in heterocyclic chemistry.

Electives* (Spring)

Herbal and Complementary Therapy (-242) 3 Credits

Herbal and Complementary Medicines, including phytomedicine, are becoming an integral part of our society and the growing self-medicating trend among consumers. This course is designed to provide students with the background that they need to advise patients on the sensible use of herbs and to promote public health and safety. Emphases will be placed on the need for phytomedicinals as alternative therapies, the safety and efficacy of herbal preparations, and the role of pharmacists in helping consumers select useful and safe herbal products. The regulatory and legislative aspects of marketing and selling phytomedicinals in the U.S. will also be discussed. Readings will include relevant articles and publications. *Prerequisites: Pharmaceutical Chemistry I & II.*

Drugs & Elderly (13228-220) 3 Credits

This course is an interdisciplinary course designed to sensitize the student to the special physiological, psychological, sociological, and economic aspects of aging. In addition, special attention will be given to

specific drug problems and solutions to these problems. *Prerequisites: Pharmacological Therapeutics I and Biopharmaceutics.*

Pharmaceutical Law and Policy (17488-318) 3 Credits

The Pharmaceutical Law and Policy course is designed to provide students with an understanding of key legal and policy issues (past and present) associated with and that shape the practice of pharmacy.

Prerequisites: None.

Research in Pharmaceutical Sciences (-302) 3 Credits each

The course deals with an introduction to techniques and methodologies in pharmaceutical sciences research. Emphasis on literature retrieval, design/conduct of experiments on a specific problem, analysis and interpretation of data for a written report. *Prerequisites: All Department of Pharmaceutical Sciences Courses in the first-year (fall and spring); minimum cumulative GPA of 2.75; and, permission of the instructor.*

Research in Clinical Administrative Pharmacy Sciences (-302) 3 Credits each

The course deals with an introduction to techniques and methodologies in clinical pharmacy research. Emphasis on literature retrieval, design/conduct of experiments on a specific problem, drug therapy clinical studies or pharmacy administration topics, and analysis and interpretation of data for a written report. *Prerequisites: Minimum cumulative GPA of 2.75 and permission of the instructor.*

Global Leadership in Interprofessional Research (IPE) 3 Credits

This course was developed as a partnership between the Howard University College of Nursing and Allied Health Sciences, the Howard University College of Pharmacy, and the University of the West Indies in Mona, Jamaica. Through a series of online lectures, interdisciplinary learning exercises, and scholarly writing activities, students will learn about their role in public health research. They will develop a report and have open dialogue across professions to enhance baseline knowledge and skills in health sciences research, with a focus on public health. Special emphasis will be placed on cultivating a deeper understanding of the United States' (US) healthcare system compared to that of a different country. Students will use research principles to explore how these systems affect various health care professions, as well as the global patient communities that they serve. Salient themes of interprofessional collaboration, leadership, public health research, global health, and cultural awareness will be covered throughout the course content. **The course will include a 7-day trip to Jamaica.** Here, students will implement team-based research projects at local health centers, participate in guided tours of health care facilities as well as cultural landmarks that teach about the evolution of healthcare in Jamaica. Finally, students will participate in a service-learning activity (a community health fair) in collaboration with health science students at University of West Indies in Jamaica. **This hybrid course will be taught online with three in-class meetings. Prerequisites: None*

New Informatics Technologies in Pharmacy 3 Credits

Virtual Reality (VR), Augmented Reality (AR), and Artificial Intelligence (AI) have been broad and fast-growing subfields of Informatics Technologies in recent years. We've heard all the media buzz, so what are the science, technology, and art issues to building these immersive and compelling experiences? And what are the impacts of those powerful techniques on traditional healthcare businesses, especially the Pharmacy as a profession? This course provides an overview of history, methods, and applications of VR, AR and AI. It covers current topics of hardware, software, interaction, psychology, algorithms (particularly machine learning), problem solving, and research that are involved in those technologies. In addition to the lectures, there will be course projects that the user will build their own virtual environments in Pharmacy settings, using novel interface and display devices. The apps and sample codes will be provided. However, the lectures will not provide any

support to completing the projects, but rather to complement the learning. In the end, this course will inform the way the PharmD students can approach and contribute to those emerging technologies, thus prepare them well for the future development. *Prerequisites: None*

**Please note: This list is subject to change without prior notice.*