

## PROFESSIONAL COURSE DESCRIPTIONS

### PH 1 Pharmacy Orientation Seminar

This course is designed as an introduction for the preprofessional student to the possibilities and processes of professional life in pharmacy. Utilizing a social/historical approach, the seminar provides a survey of the development of pharmacy practice since the emergence of scientific medicine through the current pharmaceutical-care movement. Pharmacy's position in the socioeconomic and cultural framework of healthcare delivery is defined through an exploration of the major societal, political, philosophical, economic and ethical issues affecting the profession. The various roles and career pathways of pharmacists within this framework are examined. The seminar also provides a support system for the preprofessional student and a source of information about the requirements, responsibilities and attitudes necessary for success in the professional phase of the program. After completing this course, the student will be able to cogently discuss the basic philosophy and goals of pharmaceutical care and to formulate soundly based positions on major issues affecting the profession of pharmacy. Additionally, the student will be able to initiate informed and rational decisions about potential career goals. One lecture hour.

*In order to register for PH 1 the student must be a Pharmacy major.*

*Credits: 1*

*Every Fall and Spring*

### PH 100 Pharmaceutical Care/Health Care

Students will learn how various healthcare professionals interact to provide care in hospitals, long-term care facilities, ambulatory and managed-care institutions. Students will learn the role of government as payer and provider of healthcare, the effect of managed-care systems on quality and access to health care, and the mechanisms by which health policy is formulated, and apply this knowledge to explain the roles of pharmacists in providing pharmaceutical care to patients. After completing this course, the student will have developed a foundation for applying knowledge in the pharmaceutical and clinical sciences to the provision of patient-focused care. Three lecture hours and periodic site visits.

*The pre-requisites or co-requisites of PH 101, 120, 130 and 131 are required as well as being a Third year Pharmacy major.*

*Credits: 3*

*Every Fall*

### PH 101 Social and Behavioral Aspects of Pharmaceutical Care/Ethics

This course surveys the behavioral and social aspects of pharmaceutical care such as the health-belief model, psychosocial aspects of illness, including illness behavior, psychosociological

aspects of the use of pharmaceuticals, compliance behavior, and the cultural constructs of professionalism and the professionalization of pharmacists. Additionally, this course examines value judgments in the provision of pharmaceutical care. Utilitarian, rights-based, and other major ethical approaches are considered in relation to such topics as patients' rights, truth-telling, informed consent, and the right to health care. After completing this course students should be able to demonstrate sensitivity to and facility with personal and societal values, beliefs and ethical principles in the interpersonal and decision-making processes associated with the provision of pharmaceutical care to culturally diverse populations. Two lecture hours and one recitation hour.

*The pre-requisites or co-requisites of PH 100, 120, 130 and 131 are required as well as being a Third year Pharmacy major.*

*Credits: 2*

*Every Fall*

### PH 102 Public Health in Pharmacy Practice

The role of the pharmacist in Public Health is to be able to assess the health needs of populations and to promote health improvement, wellness and disease prevention in cooperation with patients, communities, at-risk populations and other members of an interprofessional team of health care providers. At the completion of this course, students should be able to design and evaluate initiatives to promote public health such as: (1) improve access to health care and reduce health disparities, (2) increase the quality of community-based programs, (3) use communication strategies to improve health, (4) ensure the safe and effective use of medical products, (5) promote health and reduce chronic diseases associated with diet and weight, (6) improve health, fitness and quality of life through promoting daily physical activity, (7) reduce substance abuse, and (8) reduce illness, disability and death related to tobacco use and exposure to secondhand smoke.

*The pre-requisites of PH 100 and 101 are required.*

*The co-requisite of PH 102R is required.*

*Credits: 3*

*Every Spring*

### PH 111 Pharmacotherapeutics I

This is the first course in the pharmacotherapeutics series. It is designed to introduce the entry-level student to the therapeutic aspects of pharmaceutical care. Students will also be introduced to standard and specialized biomedical resources including computerized databases, textbooks, indexing systems, the Internet, and primary literature. After completing this course, this student will be able to do the following: use a medical record to find pertinent information needed to develop a pharmaceutical care plan, describe the most important laboratory tests needed to monitor a patient with a given disease state or to monitor a patient receiving a given medication,

differentiate among the various routes of drug administration, and delineate the principles of drug interactions and adverse drug reactions. In addition, the student will demonstrate proficiency in conducting an information search and in critical-thinking skills via the evaluation of case-study scenarios during recitation periods. Four lecture hours and one recitation hour.

*The pre-requisite of PH 130 is required.*

*The co-requisite of PH 111R is required.*

*Credits: 4*

*Every Spring*

### PH 120 Pharmaceutics I

This course is designed to enable students to perform calculations requisite to the practice of pharmacy. The student will learn to interpret prescription orders, and perform all calculations necessary for the compounding of prescriptions. The course is taught using a series of problem sets and includes, but is not limited to, the following: pharmaceutical units and conversions; calculation of errors; calculation of doses; using concentration terms of diluting (or concentrating) stock solutions; manufacturing isotonic solutions; calculations involving parenteral solutions and rudiments of statistics and data interpretation. Three lecture hours.

*The pre-requisites or co-requisites of PH 100, 101, 130 and 131 are required as well as being a Third year Pharmacy major.*

*Credits: 3*

*Every Fall*

### PH 121 Pharmaceutics II

(This is the first course in a three-course sequence in pharmaceutics) In this sequence of courses students will use basic and applied scientific principles to design, optimize and prepare pharmaceutical dosage forms. In Pharmaceutics II, topics include the discussion of states of matter, thermodynamics, kinetics, solution theory, diffusion and dissolution principles, and rheology. The application of these subject areas to the preparation of liquid dosage forms will also be discussed. In Pharmaceutics III the principles of biopharmaceutics and bioavailability, interfacial phenomena, and coarse dispersions will be discussed and applied to the design of polyphasic dispersions (suspensions, emulsions, magmas and gels), sterile preparations (parenterals, ophthalmics), and nasal and optic products. In Pharmaceutics IV the science, art and technology of dermal and transdermal products, powders and granules, capsules, tablets, suppositories and aerosols will be discussed. Additionally, rate-controlled and targeted drug-delivery systems and biotechnology drug products will be discussed in Pharmaceutics IV. Laboratories in Pharmaceutics III and IV will stress all aspects of interpreting and dispensing prescriptions and medication orders pertaining to the dosage forms discussed in the courses. Students will perform necessary calculations, extemporaneously prepare products for

pharmaceutical use, and simulate counseling patients and other healthcare professionals. Three lecture hours.

*The pre-requisite of PH 120 is required.*

*Credits: 3*

*Every Spring*

**PH 130 Medical Physiology and Pathophysiology**

This course is designed to discuss the relationship of normal body functioning to the physiologic changes that participate in disease production, as well as the body's remarkable ability to compensate for these changes. A complete study of human physiology that integrates all aspects of the individual cells and organs of the human body into a functional whole will be presented. This information will provide the basis that can be used to explain the pathophysiological aspects of altered health. The content of this course will focus on the health-illness continuum: (1) control of normal body function; (2) pathophysiology, or alterations in body function; and (3) system or organ failure, regardless of pathologic state (e.g., heart failure and renal failure). The didactic material will emphasize the basics of organ system pathophysiology, "bridging" these concepts to pharmaceutical care through clinical case studies that strengthen the student's grasp of the scientific basis of disease. This course will lay the foundation for further advanced study in the basic health, clinical and pharmaceutical sciences. After completing this course, the student will be able to describe the various physiological mechanisms of disease processes which are vital for the drug use decision-making process. The student will acquire the scientific knowledge essential for the application of pharmaceutical care. Five lecture hours and one recitation hour.

*The pre-requisites or co-requisites of PH 100, 101, 120 and 131 are required as well as being a Third year Pharmacy major.*

*Credits: 5*

*Every Fall*

**PH 131 Biochemical Foundations of Therapeutics**

This course is designed to provide the molecular and biochemical foundations necessary for understanding the basis of pharmacotherapeutics. The course involves the study of biomolecular interactions, macromolecular structure and functions, cellular catabolic and anabolic pathways, DNA metabolism, gene expression and biochemical bases of diseases. After completing this course, students will be able to apply biochemical principles that are requisite to the understanding of higher-level courses in medical microbiology, immunology, pharmacology and medicinal chemistry. Four lecture hours.

*The pre-requisite or co-requisite of PH 100, 101, 120 and 130 are required as well as being a Third year Pharmacy major.*

*Credits: 4*

*Every Fall*

**PH 132 Medical Microbiology/Immunology**

This course provides an in-depth study of the microbial world with emphasis on the nature and behavior of microorganisms, the interrelationships that operate between microbes and the human host in health and disease, and the principles of prevention and control of infectious disease.

Pathological and immunological changes induced by bacteria, viruses, fungi, parasites, helminths, chlamydiae, rickettsiae, mycoplasma, L-forms, and prions and the way these organisms are affected by antimicrobials will be discussed. Basic and advanced mechanisms involved in infection and immunity encompassing natural and induced modes of host defense will be emphasized. Topics in immunology will also include vaccination strategies, immune-related diseases and transplantation immunology. Biotechnology and the use of microorganisms in the production of biopharmaceuticals will be discussed. After completing this course students will be able to identify microorganisms and characterize the infectious disease process. Three lecture hours.

*The pre-requisites of PH 130, 131 are required.*

*Credits: 3*

*Every Spring*

**PH 133 Pharmacology/Medicinal Chemistry I**

(This is the first course in a three-course sequence in pharmacology/medicinal chemistry.) The pharmacology/medicinal chemistry series of courses is an integrated approach to the understanding of the molecular mechanisms of drug action and their effects on the human body. Students will obtain expertise in the principles of drug action including receptor theory and membrane permeation, and will be introduced to basic pharmacokinetic principles. Following completion of the sequence, students will be able to explain and predict the chemical basis of drug metabolism and structure activity relationships. These courses will cover pharmacological agents, utilizing an integrated approach relating chemical structure to therapeutic and adverse effects. Students will be expected to understand the pharmacological activities of agents affecting the autonomic nervous system (cholinergic and adrenergic pharmacology), central nervous system (anesthetics, antipsychotics, antiepileptics, etc.), the cardiovascular system and hormonal systems. In addition, students will master the pharmacological and medicinal chemical properties of anticancer, anti-microbial and anti-viral agents. Recitations will provide students with an opportunity to meet in small groups to evaluate case studies and work problems. Students will develop problem-solving and critical thinking skills during the recitation sessions. The recitation session in the second course of the sequence will be integrated with Pharmacotherapeutics II (PH 210). Four lecture hours and one recitation hour.

*The pre-requisites of PH 130, 131 are required.*

*Credits: 4*

*Every Spring*

**PH 200 Communication Skills in Pharmaceutical Care**

Students will learn to apply basic communication skills, such as empathic listening, conflict management and assertiveness to affect, in a positive manner, their interprofessional relationships, the clinical, economic and humanistic outcomes of patients, the productivity of technical personnel, and their success as pharmacists. The course is divided into one hour of the lecture and one hour of recitation per week. The recitation component will consist of role playing, presentation, and writing exercises that will account for a significant portion of the course grade. After completing the course, the student will be able to apply knowledge from the pharmaceutical and clinical sciences in order to counsel patients regarding the use of their medications. One lecture hour and two recitation hours.

*The pre-requisite of PH 102 is required.*

*Credits: 2*

*Every Fall and Spring*

**PH 201 Pharmacy Law and Ethics**

This course introduces the student to the legal environment of pharmacy specifically, national and New York State statutes, regulations and legal decisions. In addition, the course includes legal issues with ethical implications. After completing the course students will possess the knowledge, skills and integrity to practice pharmacy within accepted legal and professional standards of conduct, with a sense of service and responsibility to the community. Three lecture hours.

*The pre-requisite of PH 102 is required.*

*Credits: 3*

*Every Spring*

**PH 210 Pharmacotherapeutics II**

(The first of four courses.) These four courses, the second, third, fourth and fifth courses in the pharmacotherapeutics series, stress the understanding of important disease states and rational therapeutics of these conditions. The disease states are presented with emphasis on developing critical thinking and problem-solving skills. After completing these courses, students will be able to utilize pathophysiologic, pharmacotherapeutic and pharmacoeconomic principles to formulate pharmaceutical care plans for patient management. Development of pharmaceutical care plans includes problem identification, data collection and evaluation, implementation of appropriate therapy, and monitoring patient outcomes. Case studies and problem-based learning will be incorporated throughout the courses.

*The pre-requisites of PH 111 and 133 are required.*

*The co-requisite of PH 231 is required.*

*Credits: 4*

*Every Fall*

**PH 211 Physical Assessment and Drug Administration**

After completing the components of this course, students will be able to obtain medical histories; screen patients for common medical problems such as hypertension, diabetes and a variety of cancers; measure and evaluate vital signs; detect adverse drug reactions and monitor patients' therapies through a review of systems and physical examination. Students will also learn drug administration techniques and will become competent in administering intramuscular and subcutaneous injections in addition to eye and ear preparations, and medications via the use of inhalers and nebulizers. Various administration devices will also be reviewed and demonstrated. Students will be encouraged to complete their mandatory cardiopulmonary resuscitation module during this course. One lecture hour and two laboratory hours.

*The pre-requisite of PH 111 is required.*

*Credits: 2*

*Every Fall*

**PH 212 Pharmacotherapeutics III**

(The second of four courses.) These four courses, the second, third, fourth and fifth courses in the pharmacotherapeutics series, stress the understanding of important disease states and rational therapeutics of these conditions. The disease states are presented with emphasis on developing critical thinking and problem-solving skills. After completing these courses, students will be able to utilize pathophysiologic, pharmacotherapeutic and pharmacoeconomic principles to formulate pharmaceutical care plans for patient management. Development of pharmaceutical care plans includes problem identification, data collection and evaluation, implementation of appropriate therapy, and monitoring patient outcomes. Case studies and problem-based learning will be incorporated throughout the courses. Four lecture hours and one recitation hour.

*The pre-requisites of PH 111 and 230 are required.*

*The co-requisite of PH 212R is required.*

*Credits: 4*

*Every Spring*

**PH 220 Pharmaceutics III**

(This is the second course in a three-course sequence in pharmaceutics) In this sequence of courses students will use basic and applied scientific principles to design, optimize and prepare pharmaceutical dosage forms. In Pharmaceutics II, topics include the discussion of states of matter, thermodynamics, kinetics, solution theory, diffusion and dissolution principles, and rheology. The application of these subject areas to the preparation of liquid dosage forms will also be discussed. In Pharmaceutics III the principles of biopharmaceutics and bioavailability, interfacial phenomena, and coarse dispersions will be discussed and applied to the design of polyphasic

dispersions (suspensions, emulsions, magmas and gels), sterile preparations (parenterals, ophthalmics), and nasal and optic products. In Pharmaceutics IV the science, art and technology of dermal and transdermal products, powders and granules, capsules, tablets, suppositories and aerosols will be discussed. Additionally, rate-controlled and targeted drug-delivery systems and biotechnology drug products will be discussed in Pharmaceutics IV. Laboratories in Pharmaceutics III and IV will stress all aspects of interpreting and dispensing prescriptions and medication orders pertaining to the dosage forms discussed in the courses. Students will perform necessary calculations, extemporaneously prepare products for pharmaceutical use, and simulate counseling patients and other healthcare professionals. Three lecture hours and three laboratory hours.

*The pre-requisite of PH 121 is required.*

*Credits: 4*

*Every Fall*

**PH 221 Pharmaceutics IV**

(This is the third course in a three-course sequence in pharmaceutics) In this sequence of courses students will use basic and applied scientific principles to design, optimize and prepare pharmaceutical dosage forms. In Pharmaceutics II, topics include the discussion of states of matter, thermodynamics, kinetics, solution theory, diffusion and dissolution principles, and rheology. The application of these subject areas to the preparation of liquid dosage forms will also be discussed. In Pharmaceutics III the principles of biopharmaceutics and bioavailability, interfacial phenomena, and coarse dispersions will be discussed and applied to the design of polyphasic dispersions (suspensions, emulsions, magmas and gels), sterile preparations (parenterals, ophthalmics), and nasal and optic products. In Pharmaceutics IV the science, art and technology of dermal and transdermal products, powders and granules, capsules, tablets, suppositories and aerosols will be discussed. Additionally, rate-controlled and targeted drug-delivery systems and biotechnology drug products will be discussed in Pharmaceutics IV. Laboratories in Pharmaceutics III and IV will stress all aspects of interpreting and dispensing prescriptions and medication orders pertaining to the dosage forms discussed in the courses. Students will perform necessary calculations, extemporaneously prepare products for pharmaceutical use, and simulate counseling patients and other healthcare professionals. Three lecture hours and three laboratory hours.

*The pre-requisite of PH 220 is required.*

*The co-requisite of PH 221R is required.*

*Credits: 4*

*Every Spring*

**PH 230 Pharmacology/Medicinal Chemistry II**

(This is the second course in a three-course sequence in pharmacology/medicinal chemistry.) The pharmacology/medicinal chemistry series of

courses is an integrated approach to the understanding of the molecular mechanisms of drug action and their effects on the human body. Students will obtain expertise in the principles of drug action including receptor theory and membrane permeation, and will be introduced to basic pharmacokinetic principles. Following completion of the sequence, students will be able to explain and predict the chemical basis of drug metabolism and structure activity relationships. These courses will cover pharmacological agents, utilizing an integrated approach relating chemical structure to therapeutic and adverse effects. Students will be expected to understand the pharmacological activities of agents affecting the autonomic nervous system cholinergic and adrenergic pharmacology), central nervous system (anesthetics, antipsychotics, antiepileptics, etc.), the cardiovascular system and hormonal systems. In addition, students will master the pharmacological and medicinal chemical properties of anticancer, antimicrobial and anti-viral agents. Recitations will provide students with an opportunity to meet in small groups to evaluate case studies and work problems. Students will develop problem-solving and critical thinking skills during the recitation sessions. The recitation session in the second course of the sequence will be integrated with Pharmacotherapeutics II (PH 210). Four lecture hours.

*The pre-requisites of PH 132, 133 are required.*

*The co-requisite of PH 231 is required.*

*Credits: 4*

*Every Fall*

**PH 231 Pharmacology/Medicinal Chemistry II/Pharmacotherapeutics II Recitation**

Integrated recitation of Pharmacology/Medicinal Chemistry II (PH 230) and Pharmacotherapeutics II (PH 410). Required of all students taking either one or both courses. May be repeated.

*The co-requisites of PH 210 and 230 are required.*

*Credits: 0*

*Every Fall*

**PH 232 Pharmacology/Medicinal Chemistry III**

(This is the third course in a three-course sequence in pharmacology/medicinal chemistry.) The pharmacology/medicinal chemistry series of courses is an integrated approach to the understanding of the molecular mechanisms of drug action and their effects on the human body. Students will obtain expertise in the principles of drug action including receptor theory and membrane permeation, and will be introduced to basic pharmacokinetic principles. Following completion of the sequence, students will be able to explain and predict the chemical basis of drug metabolism and structure activity relationships. These courses will cover pharmacological agents, utilizing an integrated approach relating chemical structure to therapeutic and adverse effects. Students will be expected to understand the pharmacological activities of agents affecting the autonomic nervous system cholinergic

and adrenergic pharmacology), central nervous system (anesthetics, antipsychotics, antiepileptics, etc.), the cardiovascular system and hormonal systems. In addition, students will master the pharmacological and medicinal chemical properties of anticancer, antimicrobial and anti-viral agents. Recitations will provide students with an opportunity to meet in small groups to evaluate case studies and work problems. Students will develop problem-solving and critical thinking skills during the recitation sessions.

*The pre-requisites of PH 132, 133 are required.*

*The co-requisite of PH 232R is required.*

*Credits: 3*

*Every Spring*

#### **PH 240 Introduction to Complementary and Alternative Medicine**

The course is an overview of micro and macro perspectives of alternative medicine. Students will search and evaluate information on alternative medicines and make cost/benefit decisions about the use of a particular alternative medicine for a patient, supporting their decision with evidence and evaluating the validity of the evidence. They will also evaluate the use of alternative medicines in a societal context from perspectives of the health professions, biological and behavioral sciences, business and industry, practitioners and users.

*The pre-requisite of PH 102 is required.*

*Credits: 3*

*On Occasion*

#### **PH 241 Pharmaceutical Marketing and Advertising Procedures**

The course will give students insight into the strategies and tactics employed in marketing pharmaceuticals to physicians, other healthcare professionals, and consumers.

*The pre-requisite of PH 102 is required.*

*Credits: 3*

*On Occasion*

#### **PH 250 Issues in Women's Health I**

The course is designed to develop the pharmacy student's competency in a number of key issues in healthcare for women, including conditions or diseases unique to women, more prevalent or more serious in women, or for which the risk factors or interventions are different for women. Differences due to healthcare considerations, including the availability, affordability and appropriateness of healthcare services for women will also be covered. The recitation sessions will provide the students with an opportunity for developing problem-solving and critical-thinking skills via the evaluation of case studies. Two lecture hours and one recitation hour.

*The pre-requisite of PH 102 is required.*

*Credits: 3*

*On Occasion*

#### **PH 260 Survey Design and Analysis for Pharmacist**

Surveys are a common tool in both market research

and academic research projects. Learning how to develop and analyze surveys will help pharmacists from all sectors. This class will help students learn skills required to conduct survey based projects. Skills taught in this course will include: identifying specific survey objectives, designing surveys by utilizing good question writing principles, establishing a good research protocol to conduct the surveys, examining and improving psychometric properties of survey instruments and conducting analysis using data obtained from surveys.

*Credits: 3*

*On Occasion*

#### **PH 270 Pharmaceutical Biotechnology**

This course is designed to introduce students to the use of biotechnology and biotechnology-related techniques in the development of pharmacotherapeutic agents. It is aimed at students who are interested in an in-depth study of biotechnology-related products. Students will obtain expertise in the basic concepts of molecular biotechnology, the biochemical analysis of recombinant molecules, peptide chemistry and peptidomimetics (peptide drugs), antisense therapy, monoclonal antibody-based pharmaceuticals and the synthesis of cytokines (interferons, interleukins, etc.) and growth factors by recombinant techniques. After completing this course, students will be able to explain the procedures involved in the development of biotechnology-related pharmaceuticals and be familiar with the spectrum of pharmacotherapeutic agents that are produced using biotechnology and biotechnology-related techniques. The course will involve the use of problem-based learning, video presentations and experimental demonstrations to reinforce key concepts about the preparation and applications of biotechnology-derived products in the treatment of serious diseases.

*The pre-requisites of PH 130 and 131 are required.*

*Credits: 3*

*On Occasion*

#### **PH 271 Advanced Medical Microbiology**

A combination of laboratory principles along with some of the modern methodologies will be emphasized in this curriculum. The primary goal will be to expose students to these avenues from a practical angle with a clinical blend. Laboratory skills and practices (such as laboratory safety, aseptic technique, environmental growth conditions, microscopy, differential staining, media preparation and characteristics, classification of microorganisms, filtration and sterilization, operation and maintenance of basic laboratory equipment, sample collection and processing, biochemical and morphological identification of microbes etc.) mastered in this elective when integrated with knowledge obtained through medical Microbiology and Immunology will significantly enhance the understanding of diagnosis, prevention and treatment of infectious diseases. Experience gained in this course will help

immensely during subsequent years of the program (clerkship/hospital rotation) and during professional pharmacy practice.

*The pre-requisite of PH 132 is required.*

*Credits: 3*

*On Occasion*

#### **PH 272 Advanced Topics in Cardiovascular Pathophysiology**

The course provides students with the opportunity for in-depth study of cardiovascular disorders and their treatment. It focuses on the molecular mechanisms, symptoms, complications and consequences of hypertension, heart failure, ischemic heart disease, valve and congenital heart disorders, and arrhythmia. Students will have the opportunity to research and present information on a cardiovascular disease, and will utilize case studies and research articles to gain in-depth knowledge of the various cardiovascular disorders.

*The pre-requisites of PH 130 and 131 are required.*

*Credits: 3*

*On Occasion*

#### **PH 273 Advanced Molecular Immunology and Immunopathology**

This course is designed to provide a thorough understanding of the following: (1) humoral and cellular immune processes that guard against pathogens and other exogenous agents; (2) the molecular basis of the production of a repertoire of antibodies and T-cell receptors against all possible antigens by the B- and T-cells respectively by rearrangement of the respective genes; (3) hierarchy in the expression of the immunoglobulin genes, immunoglobulin isotype succession, membrane-bound and secretory antibodies; (4) major histocompatibility determinants etc.; (5) immune-mediated disorders including autoimmune disorders stemming from the four types of hyperimmune processes, transplantation immunology; (6) cancer of the immune system, acquired and inborn immunodeficiency disorders; (7) immunization strategies; (8) immunology-based approach to therapeutics; (9) immunotechniques used for clinical and diagnostic purposes; and (10) recent trends in the pharmacological application of genomics.

*The pre-requisites of PH 132 is required.*

*Credits: 3*

*On Occasion*

#### **PH 300 Visitation Introductory Pharmacy Practice Experience**

The student pharmacist will be expected to "visit" a variety of off-campus locations to observe the practice of pharmacy. More specifically, the student will be assigned to spend one 4-hour afternoon period at each of the following locations: a community pharmacy, a hospital, a long-term care facility, and at a service learning exercise organized by a community pharmacist. Additional sites may be assigned as well. The student will also observe the manner in which complementary and

alternative therapies are sold in locations without a pharmacist being available to assist patients.

Following the site visits, each student will need to complete an assignment (which in many cases includes a reflective essay) and participate in a reflective session on campus with a facilitator.  
Pass/Fail.

*Credits: 0.50*

*Every Fall*

### **PH 311 Institutional Introductory Pharmacy Practice Experience**

This IPPE will expose the students to the practice and the administrative/distributive aspects of providing direct patient care in a hospital/medical center. The student pharmacist will observe (to a small degree) and participate with pharmacists, pharmacy students, and other health care professionals/students in providing patient care. During the "acute care" portion of the experience, the student will develop rudimentary care plans, will participate in "rounds" with a medical team, and will interact with patients. During the "distributive/administrative" portion of the experience, the student pharmacist will gain competencies in various areas such as unit dose dispensing and the preparation of intravenous admixtures. The student will have ample opportunity to perform interventions that are meaningful and valuable to the health care team while becoming familiar with the role of the hospital pharmacist. Opportunity might exist for the student to participate in special projects.

*The pre-requisites of PH 100, 101, 102, 111, 121, 132 and 133 are required. The co-requisite or pre-requisite of PH 200 is required.*

*Credits: 2*

*Every Fall and Spring*

### **PH 312 Community Pharmacy Introductory Pharmacy Practice Experience**

This introductory experience course will expose the student to the patient care, administrative, distributive, and overall practice of a contemporary community pharmacy. The student pharmacist will observe and participate with pharmacists, perhaps other pharmacy students, and other health care professionals in providing direct patient care. The student will become familiar with key elements involved with dispensing prescriptions (such as interpreting a patient profile, taking an oral prescription, preparing a product label, and counseling a patient, in order to assist the pharmacist in dispensing prescriptions). The student pharmacist also will observe/participate in assisting patients to select nonprescription agents, monitoring devices, and durable medical equipment. Finally, the student will gain experience in developing care plans for ambulatory patients.  
Pass/Fail only.

*The pre-requisites of PH 100, 101, 111, 121, 132, 133, 210 and 232 are required.*

*Credits: 5*

*Every Summer*

### **PH 400 Practice**

#### **Management/Pharmacoeconomics**

The course introduces students to a variety of management concepts and practices in order to prepare them for the practice of pharmacy. This course includes a survey of criteria that facilitate the effective management of community, institutional and managed-care pharmacy. Students will apply principles of accounting, advertising, human resources management, marketing, pharmacoeconomics, and quality assurance simultaneously to optimize patient care, professional esteem and profit. The course will be devoted to issues centered around the development of innovative practices across various settings. Issues include the use of software and automation technology, disease management, education/consultation, documentation, drug-utilization evaluation, decision analysis, and maintaining financial and patient health data.

*The pre-requisites of PH 100 and 201 are required.*

*Credits: 3*

*Every Fall*

### **PH 410 Pharmacotherapeutics IV**

(The third of four courses.) These four courses, the second, third, fourth and fifth courses in the pharmacotherapeutics series, stress the understanding of important disease states and rational therapeutics of these conditions. The disease states are presented with emphasis on developing critical thinking and problem-solving skills. After completing these courses, students will be able to utilize pathophysiologic, pharmacotherapeutic and pharmacoeconomic principles to formulate pharmaceutical care plans for patient management. Development of pharmaceutical care plans includes problem identification, data collection and evaluation, implementation of appropriate therapy, and monitoring patient outcomes. Case studies and problem-based learning will be incorporated throughout the courses. Four lecture hours and one recitation hour.

*The pre-requisites of PH 111, 210, 230 and 232 are required.*

*Credits: 4*

*Every Fall*

### **PH 412 Clinical Pharmacokinetics**

This course focuses on the utilization and application of pharmacokinetic principles in developing a pharmaceutical care plan for a given patient. After completing this course, students will be able to dose and monitor drug therapy for those particular drugs with narrow therapeutic indices utilizing their knowledge regarding the influence of age, disease and drug interactions on drug disposition.

*The pre-requisites of PH 420 is required.*

*Credits: 3*

*Every Spring*

### **PH 413 Pharmacotherapeutics V**

(The fourth of four courses.) These four courses, the second, third, fourth and fifth courses in the pharmacotherapeutics series, stress the understanding of important disease states and rational therapeutics of these conditions. The disease states are presented with emphasis on developing critical thinking and problem-solving skills. After completing these courses, students will be able to utilize pathophysiologic, pharmacotherapeutic and pharmacoeconomic principles to formulate pharmaceutical care plans for patient management. Development of pharmaceutical care plans includes problem identification, data collection and evaluation, implementation of appropriate therapy, and monitoring patient outcomes. Case studies and problem-based learning will be incorporated throughout the courses. Four lecture hours and one recitation hour.

*The pre-requisites of PH 210, 212, 410 and 421 are required. The co-requisite of PH 413R is required.*

*Credits: 4*

*Every Spring*

### **PH 414 Drug Information and Literature Evaluation**

This course is designed to introduce the student to the concepts involved in responding to drug information requests including analysis of the question, the systematic search of the literature, and ways to formulate and communicate a response. In addition, the student will learn how to evaluate biomedical literature with respect to the trial design, methodology, implementation, statistical analysis of results, and justification for the conclusion. Students will learn to interpret conflicting or contradictory findings in the literature. Overall, the student will be able to judge the merit of a published trial and determine to what extent the results can be extrapolated to a typical clinical practice setting.

*The pre-requisite of PH 201 is required.*

*Credits: 4*

*Every Spring*

### **PH 420 Pharmaceutics V**

This course focuses on the study of factors that influence the in vivo disposition of drugs, e.g., absorption, distribution, metabolism and excretion. The application of the principles of biopharmaceutics and pharmacokinetics to dosing and bioavailability is discussed. Mathematical models are generated to distinguish between various methods of drug input and output. There is also a brief examination of the analytical methods used to measure drug concentrations in various body fluids. Finally, the relationship between pharmacokinetics and pharmacodynamics is explored, using a number of drug examples. Three lecture hours.

*The pre-requisite of PH 221 is required.*

*Credits: 3*

*Every Fall*

**PH 421 Self Care**

This course is designed to introduce the student to commonly used non-prescription products, vitamins, health foods and other nutritional supplements, home diagnostic kits, alternative medicine options and prescription accessories. It emphasizes the need for pharmacists to be proactive and interactive with patients in recommending and in using nonprescription products and to ensure their correct and safe usage. After completing this course, students will be able to perform the following tasks: assist patients in selecting the appropriate dosage form for self care and advising patients on correct use of selected non-prescription drugs; counsel patients concerning self care; monitor patients for unwanted drug effects and possible drug interaction; monitor patients' progress with regard to therapeutic objectives to maximize compliance and improve outcomes of therapy; counsel patients regarding the use of home diagnostic devices, health foods and vitamins, contraception and family planning; advise patients on the appropriateness of alternative medicine, diets, food and exercise. Students will have the opportunity to develop critical thinking skills through evaluation of case studies. Three lecture hours.

*The pre-requisite of PH 212 is required.*

*Credits: 3*

*Every Fall*

**PH 430 Iatrogenic Diseases**

This course is designed to discuss unfavorable or deleterious effects of a therapeutic or diagnostic regimen. The main focus of the course is to discuss drug-induced adverse reactions and their mechanisms at biochemical, cellular and molecular levels on various systems and functions of the patients undergoing treatment. In addition, the course will include discussion of unwanted responses that follow multiple drug therapy (drug interactions), and diagnostic procedure and/or use of any diagnostic agent. After completing this course, the student will be able to utilize this knowledge in counseling patients about expected adverse effects of their medications and/or diagnostic regimen. The didactic material will be supplemented by case reports from the literature. The reading assignments will include, but not be limited to, researching of overdose treatment protocols and other iatrogenic scenarios from the medical literature. Three lecture hours.

*The pre-requisites of PH 133, 210, 212, 230, 232 and 410 are required.*

*Credits: 3*

*Every Spring*

**PH 440 Health Promotion: Planning and Evaluating Pharmaceutical Care Programs**

The development, implementation and evaluation of a successful pharmaceutical care program depend on the critical application of several educational and behavioral principles and theories. To properly

assess the value of pharmaceutical care programs, pharmacists need to be aware of appropriate methodological designs for developing and evaluating their pharmaceutical care programs. Programs that are better designed can yield more meaningful data as to which pharmaceutical care programs will most likely have the greatest impact on patient care. This course will help pharmacy students understand the basic steps and principles necessary to design, implement and evaluate a pharmaceutical care program. The course will also prepare students in writing a brief project proposal, develop brief methods to assess selected outcomes of a program, develop promotional items to market a pharmaceutical care program, and prepare a presentation about a program they have developed. Three lecture hours.

*The pre-requisites of PH 102, 210, 212 are required.*

*Credits: 3*

*On Occasion*

**PH 450 Patient Education**

This course is designed to help pharmacists who are not skilled in patient education but need to know how to design, implement and evaluate planned programs of educational activities to help improve patients' health behaviors and/or health status. This is a course on behavior, not drug information. Three lecture hours.

*The pre-requisite of PH 102 is required.*

*Credits: 3*

*On Occasion*

**PH 451 Pharmaceuticals in Nature**

With the growing popularity of natural drugs, new challenges are facing pharmacists in providing pharmaceutical care. It is the responsibility of practicing pharmacists to have an understanding of all the pharmaceutically active products their patients are using. This course will combine didactic classroom study with weekly field trips to search for and identify pharmaceuticals in their indigenous environment. Scientific research with specific product information on thirty of the most popular clinically relevant herbal products (focusing on those found in the local environment) will be presented. The side effect profile for each herbal medicine will be clearly delineated and potential interactions and contraindications will be addressed. To enhance the formulation of pharmaceutical care plans for patient management these products will be critically compared to more conventional medications used for similar indications. Concepts in the arena of alternative medicine such as naturopathic medicine and homeopathy will be discussed. Field trips will account for approximately one-half of the time allotment of this course. Proximate to the New York metropolitan area, Gateway National Recreation Area offers the perfect field laboratory to study naturally occurring useful plants indigenous to this vast complex natural resource. Factors responsible for the accelerating decline and

depletion of these vital coastal areas will be considered. Recognizing the need for protection and conservation of this delicate ecosystem will lead to a discussion of political issues relative to this habitat at risk. In addition, a rudimentary understanding of the natural wildlife that impacts on the environment that sustains these natural products will lead to discussion of the shore birds that are a part of the delicate ecosystem that is under study.

*Credits: 3*

*On Occasion*

**PH 460 Drug Metabolism and Disposition**

This course will discuss and detail the major pathways that contribute to drug metabolism and disposition: biotransformation enzyme processes and membrane transport systems. The first part of the course will focus on the various enzyme systems that are responsible for biotransformation (e.g., cytochrome P-450 and glucuronyl transferase). Topics to be discussed include classification of these systems and their distribution in the body, phenotype/genotype issues, and clinical implications. The second part of the course will cover the numerous membrane transport systems that have been identified in four organ systems that are of primary importance for drug disposition and activity: gastrointestinal, hepatobiliary, renal, and central nervous systems. A focus of this material will be the strategies used to modulate these transport systems to improve bioavailability, distribution and, consequently, efficacy. Three lecture hours.

*The pre-requisites of PH 121, 131, 220 and 221 are required.*

*Credits: 3*

*On Occasion*

**PH 462 Applied Pharmacokinetics**

This course consists of lecture and computer classroom instruction. The course has a practical goal and students will work with data sets from recent literature to perform the required statistical and pharmacokinetic analysis. The course will provide students with hands-on practice with professional pharmacokinetic software packages. The course consists of an introductory overview of biostatistical topics such as elementary probability theory, hypothesis testing, analysis of variance, regression and correlation, and non-parametric methods. All these concepts will be explained with examples pertinent to pharmacokinetic analysis. Then the students will be exposed to the principles of clinical study design including bioavailability and bioequivalence studies according to FDA guidelines. Primary clinical literature will be analyzed and used as a source of data for in-class analysis. The basic compartmental and non-compartmental pharmacokinetic models will be reviewed. The students will learn how to use nonlinear regression programs (winnonlin and/or ADAPT II) to perform nonlinear regression analysis on pharmacokinetic data. A detailed discussion of

the computer output will permit the selection of the most appropriate model and parameters describing the data based on sound statistical principles.

*The pre-requisites of PH 121, 220 and 221 are required.*

*Credits: 3*

*On Occasion*

#### **PH 463 Sterile Products**

This course will explain in detail the various procedures necessary to prepare, dispense and label sterile products, to validate methods of sterilization and aseptic processes, and to assure the quality and control of environmental conditions for aseptic operations. Aseptic techniques, incompatibilities, finished product release testing, storage and expiration dating will also be presented. Students will gain practical experience in laboratories in compounding, dispensing, reading and interpreting prescriptions.

*The pre-requisite of PH 220 is required.*

*Credits: 3*

*On Occasion*

#### **PH 464 Prescription Accessories**

This course will discuss the importance of the prescription accessory department as a part of the ambulatory pharmacist's practice. Prescription accessories will be categorized with respect to the pharmacist's participation as a member of the healthcare team. Topics to be covered include: thermometers, home pregnancy tests, pregnancy preventatives, enemas, feminine syringes, pessaries, rectal and vaginal dilators, nasal aspirators, diabetic monitors and accessories, male impotency pumps, SIDS monitors, enuretic devices, vaporizers, humidifiers, nebulizers, atomizers, wound care, tissue trauma, bandages and surgical dressings, ostomy supplies and devices, durable medical equipment, and types of orthotics and fitting procedures for such accessories. Issues related to third party reimbursement policies for prescription accessories will also be discussed.

*The pre-requisites of PH 201 and 211 are required.*

*Credits: 3*

*On Occasion*

#### **PH 465 Contemporary Compounding**

This course is designed to educate pharmacy students in the compounding of extemporaneous dosage forms such as capsules, suppositories, suspensions, ophthalmic solutions, lip balms, ointments, etc. It also introduces the students to the concepts of home infusion therapy and gives them an opportunity to practice the preparation of total parenteral admixtures. The objective of the course is to provide pharmacy students with a hands-on opportunity to practice their chosen profession. As compounding pharmacy continues to grow, it will provide more pharmacists with the opportunity to use their innovative skills to solve patient problems. In this course, students will be trained to assess and be aware of the requirements

for and the uniqueness of formulating a specific drug product for a specific patient. This service constitutes an important component in providing pharmaceutical care. Reference materials used in this course will familiarize the student with the facilities, equipment and supplies necessary for extemporaneous compounding; records and record-keeping; stability of compounded products, pharmaceutical compounding calculations, quality control, etc. Laboratory hours will ensure that students properly interpret prescriptions, employ actives and excipients that are appropriate for any given dosage form. It will also make students cognizant of the quality of drugs, excipients, and other additives in terms of their stability, compatibility and, when necessary, sterility. Students will be exposed to compounding techniques commensurate with 21st century compounding.

*The pre-requisites of PH 220 and 221 are required.*

*Credits: 3*

*On Occasion*

#### **PH 466 Theory and Design of Controlled-Release Dosage Forms**

This course will cover the theoretical aspects of currently utilized dosage forms designed for controlling the release of drugs to the human body. A wide variety of drug delivery system designs will be analyzed in this course. Students taking this course will study the mechanisms and kinetics of drug release from these systems, structure and properties of fabrication materials, principles of molecular diffusion across polymer barriers and transport across biological interfaces.

*The pre-requisites of PH 121, 220 and 221 are required.*

*Credits: 3*

*On Occasion*

#### **PH 467 Industrial Pharmacy**

This course is designed to introduce the professional program pharmacy student to processes such as formulation, scale up, production, and stability-testing utilized in the manufacturing of pharmaceutical dosage forms. The methodologies and technologies used in these processes to produce various dosage forms such as tablets, ointments, creams, capsules, suspensions and sterile products will be presented. The different techniques used to formulate dosage forms possessing unique properties such as sustained or delayed release dosage forms will also be examined.

*The pre-requisites of PH 220 and 221 are required.*

*Credits: 3*

*On Occasion*

#### **PH 470 Biochemical Cofactors and Nutritional Supplements**

This course is designed to introduce students to the basic biochemistry of vitamins, cofactors, and other nutritional supplements. It is aimed at students who are interested in gaining an in-depth knowledge of these agents. Students will obtain

expertise in the mechanism of action of all the major vitamins, the role of metals and other cofactors in augmenting the action of various enzymes, and their importance in key metabolic pathways. They will also explore the biochemical basis for the possible benefits of other nutritional supplements. Students will review current scientific data on nutritional supplements to assess the validity of anecdotal claims in the prevention or cure of diseases. After completing this course, students will be able to explain the mechanism of action of vitamins and nutritional supplements, assess the validity of claims by manufacturers and counsel patients and consumers on any special precautions and effective uses of these agents. The course will involve the use of problem-based learning, reviews of current scientific literature, and video presentations to reinforce key concepts and issues concerning the use of vitamins and other nutritional supplements.

*The pre-requisites of PH 131 and PH 232 are required.*

*Credits: 3*

*On Occasion*

#### **PH 471 Pharmacogenomics and Personalized Medicine**

This course will cover and introduction to the history of pharmacogenetics and pharmacogenomics, including a basic review of mechanisms of gene expression and gene regulation along with basic genetic concepts. Other topics that will be presented include genomic technologies including DNA sequencing, microarrays, and the quantitative polymerase chain reaction (QPCR). These technologies will be discussed in the specific context of drug discovery and development, and in human genotyping of genes involved in drug metabolism and transport. Students will be given the opportunity to review current case studies or examples of pharmacogenomics and drug responses.

*Credits: 3*

*On Occasion*

#### **PH 599 Special Projects**

This elective provides students with an opportunity to pursue their specific areas of interest in pharmacy, through working with one of the faculty members on a special project. As most of these independent studies and projects are research oriented, this course will provide students opportunities to develop critical thinking and problem-solving skills by doing one or more of the following: developing a study hypothesis, designing a study, researching a topic, collecting data, and analyzing as well as presenting the data. Through working with faculty members in their area of interest, students also are able to explore in greater depth the knowledge base in that particular area of pharmacy. Students will choose to work with a faculty member in developing, implementing and completing a pharmacy project. The faculty member must be willing to mentor and work with

the student to develop a project and guide him/her to completion. Once a student identifies a faculty member, the student will discuss and develop a hypothesis for a mutually agreed-upon project. A project proposal must be developed and signed off on by the faculty and the division director. The student must submit this signed-off proposal to the Assistant Dean for Academic and Student Affairs in order to be enrolled in the course.

*Credits: 3*

*On Occasion*

#### **PH 600 Community Pharmacy Advanced Pharmacy Practice Experience**

This experiential program will expose the student to the practice of pharmaceutical care in a community setting. Specifically, the student will develop a clear understanding of the role of the community practitioner and will understand the rationale for using prescription and nonprescription products. After completing this course the student will have the competencies to perform the functions of a registered pharmacist, such as dispensing a prescription, compounding an extemporaneous product, counseling patients appropriately, maintaining appropriate records, and advising physicians, dentists, nurses and other healthcare professionals about the use of prescription and nonprescription products. In addition, the student will be able to prepare and monitor healthcare plans for a variety of disease states such as asthma, diabetes mellitus, hypercholesterolemia and hypertension. The student's oral and written communication skills will be honed via interactions with other healthcare professionals.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*All Sessions*

#### **PH 602 Ambulatory Advanced Pharmacy Practice Experience**

This required advanced pharmacy practice experience (APPE) is designed to offer the student the opportunity to apply knowledge previously acquired from didactic courses in an ambulatory setting (usually, a hospital clinic). The student will sharpen his/her skills in verbal and written communication, patient data collection and evaluation, medication consultation, and medication therapy management. In this APPE the student will interact with health care providers in the out-patient setting to deliver patient centered care, provide drug information to patients and health care professionals, and participate in patient counseling sessions with an emphasis on adherence management. Participation in this APPE will afford the student pharmacist an opportunity to be involved in the evaluation of educational material for ambulatory patients and the documentation of pharmaceutical interventions that benefit the patient.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*All Sessions*

#### **PH 603 Drug Information Advanced Pharmacy Practice Experience**

This advanced practice experience is designed to provide students with hands-on skills and expertise to retrieve drug information, evaluate the literature and communicate a drug-information response.

This clerkship is also designed to provide the student with more experience using computerized database retrieval systems. Students learn to apply a systematic approach to answering drug information requests. Students will be expected to use various types of reference sources, full-text databases, indexing/abstracting services, and Internet-based drug information to answer information requests.

In addition, students will evaluate literature, review monographs, write abstracts, write a drug monograph for formulary review, and/or write a column for publication.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 2.50*

*All Sessions*

#### **PH 604 Internal Medicine Advanced Pharmacy Practice Experience**

These experiences are designed to allow students the opportunity to develop skills based on the knowledge acquired in previous courses with an emphasis on formulating patient-specific pharmaceutical care plans. As an integral member of the healthcare team, the student will participate in medical rounds at a designated affiliate hospital/medical center. The student will, after completion of the clerkship, be able to demonstrate proficiency in critical thinking skills through the resolution of drug-related problems encountered during the rotations. The student shall be able to evaluate, criticize and modify patient-specific care plans, review and discuss treatment modalities, and provide monitoring parameters for therapeutic regimens and/or various disease states. Students will have ample opportunity to develop and demonstrate adequate communication skills and perform patient counseling.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*All Sessions*

#### **PH 606 Institutional Practice Advanced Pharmacy Practice Experience**

This advanced practice experience is designed to familiarize the student with various aspects of institutional pharmacy practice by rotating through various areas within the pharmacy service of a hospital or medical center. Students will be exposed to various modern distributive systems, administrative functions, medication use evaluations, hospital committees, as well as the institution's policies and procedures. After completion of the clerkship, the student will have

developed skills needed to make decisions involving the selection, storage and distribution of various pharmaceuticals, will be proficient in compounding, packaging and labeling practices of the institution, will be proficient in aseptic technique involving sterile products, will be able to decide which dosage forms and routes of administration are preferable for patient specific needs, and will gain valuable experience in counseling patients about their pharmacotherapy. Additionally, the student will have the opportunity to develop his/her sense of ethics and professionalism. Pass-Fail only.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*All Sessions*

#### **PH 607 Pharmacy Grand Rounds**

Monthly rounds are held in residence at LIU Pharmacy during the senior experiential phase of the professional program. Students are required to attend the rounds which will focus on new and recent developments in pharmacy and the provision of pharmaceutical care. Presentations and discussions may include issues of pharmacotherapeutics, pharmacoeconomics, pharmacy law, current professional concerns and initiatives, and innovative career pathways. Course may be repeated. Monthly rounds. Pass-Fail only.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 0*

*All Sessions*

#### **PH 608 Acute Care Advanced Pharmacy Practice Experience**

This required advanced pharmacy practice experience (APPE) provides an opportunity for the senior student to apply his or her knowledge in the patient care arena. In this APPE, the student pharmacist will be interacting with health care professionals and patients in one or more acute care settings. The student pharmacist will participate in medical rounds, develop treatment plans for patients, interview and counsel patients, perform interventions on a patient's behalf when needed, and, in general, gain exposure to one or more specialty areas in a hospital or medical center. By the completion of the APPE, the student pharmacist will have improved his or her critical thinking skills, taken responsibility for the provision of patient care, and developed important skills and abilities needed for life-long learning.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*All Sessions*

#### **PH 621 Drug Information in Health Care Publishing Advanced Pharmacy Practice Experience**

This advanced pharmacy practice experience (APPE) elective consists of five weeks at Physicians'

Desk Reference (PDR), during which time the student will learn the manner in which drug information is compiled and disseminated to health care professionals and, perhaps, the general public. The student will have the opportunity to create concise drug information monographs and/or articles based on FDA-approved labeling and will participate in planning and creation of publications for the health care marketplace. Students will develop familiarity with creative aspects of drug information publication and further improve their medical/scientific writing and literature evaluation skills. Depending on the time of the year, students may get the opportunity to gain experience with one or more publications including the following: PDR main edition; PDR for Nonprescription Drugs, Dietary Supplements, and Herbs; PDR Nurse's Drug Handbook; Red Book; and PDR Monthly Prescribing Guide.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*On Occasion*

#### **PH 622 University Hospital-Based Drug Information Advanced Pharmacy Practice Experience**

The University Hospital-Based Drug Information advanced pharmacy practice experience allows the student to develop a wide base of pharmacotherapeutic knowledge in all areas relating to pharmacy practice. The student will enhance his/her skills in drug information retrieval and evaluation of the material, as well as the source from which it came. These skills will be integrated into the students' overall experience through written and verbal communication with members of the healthcare community. Students will gain practical experience by responding to drug information inquiries from healthcare professionals, both through the drug information center and at multi-disciplinary meetings; preparing written documents to disseminate drug information; participating in pharmacy journal clubs; and becoming familiar with the administrative activities within a hospital-based Drug Information Center. Professional conduct with phone and written communication will be emphasized. This advanced drug information elective clerkship will provide the student not only with a reinforcement of skills learned in the drug information clerkship, but will expose the student to administrative activities of a drug information specialist in a university hospital. Career options as a drug information specialist will be thoroughly discussed.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*On Occasion*

#### **PH 623 Advanced Drug Information University-Based Advanced Pharmacy Practice Experience**

Today's pharmacists participate in all aspects of

patient care. Comprehensive delivery of pharmaceutical care requires that pharmacists effectively access, interpret, organize, and provide pertinent information. Pharmacists who provide such information readily to patients and members of the health care team will be recognized for this expertise. Requests for drug information are frequent and require rapid follow up. Referrals to drug information specialists may not be possible because of time constraints. Furthermore, many organizations do not have such specialists. Therefore, pharmacists directly responsible for patient care must be skilled in drug information retrieval and evaluation. This elective drug information advanced pharmacy practice experience (APPE) will help develop and improve the student's skills in providing drug information. The APPE consists of five weeks at the International Drug Information Center (IDIC). Advanced training will enhance the student's competency and expertise in retrieving and disseminating drug information to health care professionals. In addition, students will develop familiarity with various resource materials and further improve their scientific writing skills.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*On Occasion*

#### **PH 624 Extended Internal Medicine Advanced Pharmacy Practice Experience**

The Extended Internal Medicine experience is designed to allow the student the opportunity to develop and use skills based on the knowledge acquired in previous courses with emphasis on formulating patient-specific care plans. The student must attain these skills to be prepared to practice pharmacy independently. As an integral member of the health care team, the student will participate in daily work and attending rounds in an in-patient setting. This will incorporate rounding on an internal medicine floor and, to some extent, perhaps in a pharmacy specialty area at a designated hospital or medical center. The student will be afforded the opportunity to develop critical thinking skills by collecting relevant data, evaluating the data, formulating a judgment from the information presented, formulating an opinion, and lastly making a decision. While making clinical decisions, this APPE will further develop the student's skills in critical thinking, problem solving, literature evaluation, and written and oral communication.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*On Occasion*

#### **PH 625 IV Admixture/Home Infusion Advanced Pharmacy Practice Experience**

One of the fastest growing fields in pharmacy is that of home infusion preparations. Due to the high cost of hospitalization, more and more insurance

companies and physicians are requiring patients to be treated at home, in nursing homes and in hospices whenever feasible. This very often requires the use of IV and TPN therapy to be administered by a nurse or qualified home attendant. A number of specialized pharmacies are now providing these preparations and the need for pharmacists particularly skilled in the preparation of the products is steadily growing. This elective advanced pharmacy practice experience focuses on this skill and allows the student to become totally proficient in all aspects of home infusion therapy. The student will become proficient in aseptic technique and compounding parenteral products. Students also learn proper procedures for safely preparing chemotherapeutic agents and will have the opportunity to reinforce their ability to perform pharmaceutical calculations. In some instances, the student may have input into the selection and proper dosage of medication. Finally, the student will have the opportunity to learn about the administrative aspects of this specialized area.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*On Occasion*

#### **PH 626 Hospital Pharmacy Administration Advanced Pharmacy Practice Experience**

This elective advanced pharmacy practice experience (APPE) provides opportunities for the student to work with the director of pharmacy and other administrative personnel to develop skills necessary to manage the day-to-day activities involved with a department of pharmacy in a hospital. Students will learn the process involved in evaluating the appropriateness of drug therapy or effectiveness of drug delivery activities. They will also have the opportunity to work with other health-care disciplines to ensure the safe and effective use of medications and prevent/minimize drug-related problems. Examples of course activities include attending administrative meetings, developing drug utilization evaluation criteria, writing a drug monograph for presentation to the Pharmacy and Therapeutics Committee, and reporting adverse drug reactions.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*On Occasion*

#### **PH 627 Treatment of Substance Abuse Advanced Pharmacy Practice Experience**

Patients who abuse controlled substances may now be followed and treated through a continuum of care that starts with detoxification, is followed by a rehabilitation program, and continues with visits to outpatient facilities that support the patient's education and psycho-social needs. The pharmacist must be aware of the special problems related to the care of these patients, particularly in regard to their specific pharmacotherapeutic needs. This elective advanced pharmacy practice experience (APPE)

provides the student with the opportunity to provide direct patient care for patients with issues related to the abuse of controlled substances. Upon the completion of this APPE, the students will be able to do the following: identify, evaluate, ameliorate, and recommend solutions to the drug related problems; monitor the outcomes of the patient's pharmacotherapy; evaluate the literature on substance-abuse treatment programs.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*On Occasion*

### **PH 628 Pharmacy Ambulatory Compounding Advanced Pharmacy Practice Experience**

A select number of pharmacists and pharmacies have specialized in compounding extemporaneous products. They have acquired the expertise, equipment and the ingredients necessary to prepare the oral and topical medication specific to the individual patient's requirements. There is a need for pharmacists to be able to perform compounding functions in a pharmacy also described as "secundum artum." This elective advanced pharmacy practice experience is designed to allow the student, who is interested in this limited but growing field of pharmacy, an opportunity to develop compounding skills as well as to allow the student to perfect his/her counseling and general prescription dispensing skills.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*On Occasion*

### **PH 629 Ambulatory Care Elective Advanced Pharmacy Practice Experience**

This is a 5-week elective APPE in community pharmacy. This experience will prepare students to practice patient-centered care in the community setting. Students will have the opportunity to develop and participate in various patient care activities such as disease state management, medication therapy management, and health screenings/wellness programs. Students will provide comprehensive patient counseling in a variety of areas including nonprescription, herbal, and prescription medications, and home health devices. Additionally, students will gain experience with MTM, and communicating recommendations to other health care providers including pharmacists, physicians, and nurses. The students will also participate in dispensing activities, specialty compounding, and other patient services for the advancement of patient care in the community pharmacy.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*On Occasion*

### **PH 630 Cardiovascular Pharmacotherapy Advanced Pharmacy Practice Experience**

The cardiovascular pharmacotherapy elective advanced pharmacy practice experience (APPE) provides opportunities for students to develop an in-depth understanding of the pathophysiology and pharmacotherapy of cardiovascular disease states, and most importantly, allows students to deliver pharmaceutical care to patients suffering from these diseases. After completing this APPE, the students will be able to do the following: identify, evaluate, resolve, and prevent drug-related problems; implement appropriate pharmacotherapy; monitor patient outcomes; critically evaluate literature dealing with cardiovascular disease.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*On Occasion*

### **PH 632 Critical Care Pharmacotherapy Advanced Pharmacy Practice Experience**

Through observation and practice, this elective advanced pharmacy practice experience allows the student to develop his/her role as the pharmacist on the ICU team. Expansion of the student's knowledge of pharmacotherapy in the critically ill patient, specifically, general medicine, neurologic, pulmonary, cardiovascular, peripheral vascular, and trauma surgery patients is expected. Emphasis will be placed on prospective drug therapy management that involves the monitoring of efficacy and toxicity of regimens related to areas such as sedation, pain management, infectious disease, cardiology, neurology, renal and hepatic disease, nutrition and preventative medicine (e.g., stress ulcer prophylaxis, deep vein thrombosis prophylaxis). While making clinical decisions, this elective will refine the student's skills in critical thinking, problem solving, literature evaluation, and written and oral communication.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*On Occasion*

### **PH 633 Emergency Medicine Pharmacotherapy Advanced Pharmacy Practice Experience**

The Emergency Medicine elective advanced pharmacy practice experience allows the student to develop a wide base of knowledge in the patient assessment and management of various undifferentiated conditions as they present to the Emergency Department. The student will learn the three dimensions of the emergency medicine model of practice, all of which are interrelated. For example the student will become familiar with the patient acuity (low level, emergent, and critical), tasks that must be completed by the healthcare team, including pharmacotherapy and the vast number of conditions that may be observed. The student will have the opportunity to provide patient care to all locations of the ED, such as "fast track", resuscitation, observation unit, and pediatric

emergency department with an emphasis on surveillance for drug related problems, assuring appropriate pharmacotherapeutic interventions, conformance with hospital formulary and medication guidelines, facilitating expedient medication procurement (supervised), monitoring to assure achievement of desired endpoints and discharge plans. An emphasis will be placed on patient counseling and communication with health care providers for the acute stabilization of patients and for transfer of the patient to other services within the hospital such as internal medicine, cardiology, and trauma service and those who may be released from the ED. Students will gain practical experience by participation in multidisciplinary activities that may include daily attending rounds, weekly grand rounds, pharmacy journal club, and pharmacotherapeutic care plan preparation for a variety of patients. Acute stabilization, identifying drug related-ED admissions, reporting of out-of-hospital adverse drug events, as well as in-hospital adverse drug events will be emphasized, and surveillance for patients at risk with medications administered to the patient while in the ED.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*On Occasion*

### **PH 634 Geriatric Advanced Pharmacy Practice Experience**

This geriatric elective advanced pharmacy practice experience provides opportunities for students to develop an in-depth understanding of the pathophysiology and pharmacotherapy of common disease states, as well as pertinent social and psychological issues involved in providing pharmaceutical care to geriatric patients. This APPE also allows students to deliver pharmaceutical care to patients/residents residing in nursing homes or similar environments. After completing this APPE, the student will be able to do the following: identify, evaluate, resolve, and prevent drug-related problems, implement appropriate pharmacotherapy, monitor patient outcomes, and critically evaluate literature in geriatric medicine.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*On Occasion*

### **PH 635 Nephrology Pharmacotherapy Advanced Pharmacy Practice Experience**

During this 5 week Advanced Pharmacy Practice Experience, students will be able to learn how to manage patients with various types of kidney problems and how to adjust patient's pharmacologic therapies to improve functioning and prevent disease progression as well as recognize the potential nephrotoxicity of various therapeutic and diagnostic agents. Students will be part of a multidisciplinary team working with various health care professional to improve care of patients with

renal disorders.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*On Occasion*

#### **PH 636 Infectious Disease Pharmacotherapy Advanced Pharmacy Practice Experience**

Infectious diseases are major causes of human morbidity and mortality worldwide. This elective advanced pharmacy practice experience provides opportunities for students to develop a greater understanding of the pathophysiology and pharmacotherapy of infectious diseases. Experience will be gained in the collection, interpretation and application of patient specific data, which are used to assist with the design and implementation of therapeutic antimicrobial regimens. Further, this APPE is intended to provide the student with the opportunity to learn to ensure the safe, appropriate and economical use of antimicrobial agents in patients through the application of specialized skills, knowledge and functions.

*The pre-requisite of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*On Occasion*

#### **PH 637 Pediatric Pharmacotherapeutics Advanced Pharmacy Practice Experience**

The pediatric pharmacotherapy elective advanced pharmacy practice experience provides opportunities for the student to develop an in-depth understanding of the pathophysiology and pharmacotherapy of commonly encountered pediatric disease states. The clerkship also allows the student to provide patient specific care to pediatric patients. A primary emphasis of this clerkship experience is to develop problem solving skills in pediatric pharmacotherapy. The student will gain practical clinical experience by actively participating in a variety of multidisciplinary activities including: daily service and attending rounds, pediatric grand rounds, pediatric chiefs rounds, and pediatric pharmacy journal club. The student will receive individualized attention by the preceptor on a daily basis. Daily pharmacotherapy rounds with the preceptor will emphasize the principles of patient specific care plan development for pediatric diseases.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*On Occasion*

#### **PH 638 Psychiatric Pharmacotherapy Advanced Pharmacy Practice Experience**

In this elective advanced pharmacy practice experience students will round with the multidisciplinary psychiatric team on a psychiatric closed unit and partake in activities with the other members of the team which ultimately result in improved patient outcomes. Disease state management from the student's standpoint includes

educating patients, reviewing therapies, making recommendations, monitoring patient progress, and documenting services and outcomes.

Additionally, the student will apply critical thinking skills specific to the area of psychiatry, through the resolution of drug-related problems encountered during the rotation. After completing this clerkship, the student will be able to do the following relative to patients with psychiatric illnesses: identify, evaluate, resolve, and prevent drug-related problems; implement appropriate pharmacotherapy; monitor patient outcomes, and evaluate psychiatric literature.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*On Occasion*

#### **PH 639 Neonatal Intensive Care Pharmacotherapy Advanced Pharmacy Practice Experience**

The neonatal intensive care pharmacotherapy elective advanced practice experience provides opportunities for students to develop an in-depth understanding of the pathophysiology and pharmacotherapy of various disease states, and allows students to deliver patient-specific care to patients suffering from these disorders. Through observation and practice, the student will develop his/her role as the pharmacotherapy expert on an interdisciplinary NICU team. With the multitude of pharmacotherapeutic interventions needed in these critically ill patients, students have a unique opportunity to recommend appropriate drug therapy and parenteral nutritional support. After completing this clerkship, the student will have an expanded expertise in the management of pre-term patients. Emphasis is placed on prospective pharmacotherapy and nutrition - including antibiotics, methylxanthines, surfactant, vaccines, total parenteral nutrition (TPN), and the rational selection of IV fluids.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*On Occasion*

#### **PH 640 Long Term Care Advanced Pharmacy Practice Experience**

The long-term care APPE provides opportunities for students to develop an in-depth understanding of the pathophysiology and pharmacotherapy of common disease states as well as pertinent social and psychological issues involved in providing pharmaceutical care to long-term care patients. This APPE allows students to deliver patient care to long-term care residents. The students also will gain perspective into the unique administration aspects of managing pharmacy services in long-term care facilities (e.g., external vendors, pharmacy consultants, modified unit dose distribution systems, and ward stock system). After completing this APPE, the students will be able to do the following: identify, evaluate, resolve, and prevent

drug-related problems, implement appropriate pharmacotherapy, monitor patient outcomes, and critically evaluate literature in long-term care medicine.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*On Occasion*

#### **PH 641 Managed Care Pharmacy/PBM Advanced Pharmacy Practice Experience**

This elective advanced pharmacy practice experience allows the student to develop skills and competencies that apply to the population and evidence-based pharmaceutical care. Students will receive an understanding and exposure to a managed care pharmacy practice setting, including plan design and benefit management "tools," and participate in a service that provides information to pharmacists and/or other health care professionals; and will participate in specific projects on contemporary pharmacy practice issues.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*On Occasion*

#### **PH 642 Medication Policy Development Advanced Pharmacy Practice Experience**

This elective advanced pharmacy practice experience (APPE) provides opportunities for the student to work with other health-care disciplines to ensure the safe and effective use of medications and prevent/minimize drug-related problems. Medication management is often an important component in the treatment of many diseases and conditions. A well-planned and implemented medication management system supports patient safety and improves the quality of care. Unfortunately, adverse drug events and medication errors occur daily in all health care environments. Many patients are injured or die in hospitals each year as a result of adverse drug events, and medication errors are frequently implicated as causes for these events. A "medication error" results from an error in the process of prescribing, dispensing, and/or administering a medication. An "adverse drug reaction" is any response to a drug that is noxious and unintended, and which occurs at doses normally used in humans for prophylaxis, diagnosis or therapy of disease, or for the modification of physiological function. A safe medication management system addresses all steps of a medication use process, including selection and procurement, storage, ordering and transcribing, preparing and dispensing, administration and monitoring. In order to implement and sustain an effective system, pharmacists practicing in a health care setting must proactively identify safety risks at each step of the medication use process and develop/implement policies to reduce/prevent adverse drug events. Examples of activities include participating in the development or modification of policies, conducting drug use evaluations, and

tracking and trending adverse drug reaction and medication error data.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*On Occasion*

**PH 643 Medical Communications in the Pharmaceutical Industry Advanced Pharmacy Practice Experience**

This elective advanced pharmacy practice experience consists of five weeks at a medical information department within a pharmaceutical company. This experience will enhance the student's communication, presentation, and writing skills and enhance the student's competency in retrieving and disseminating medical information to consumers and health care professionals while helping the department meet company goals and objectives. The student will gain experience responding to specific medical information requests and will participate in departmental projects related to the provision of medical information.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*On Occasion*

**PH 644 Medical Writing for a Pharmacy Periodical Advanced Pharmacy Practice Experience**

This elective advanced pharmacy practice experience (APPE) consists of five weeks at Drug Topics News Magazine, during which time the student will learn the manner in which drug information and other relevant pharmacy practice information is compiled and disseminated to pharmacists. The student will have the opportunity to create articles on new drugs, guidelines, and other newsworthy topics based on FDA-approved labeling, news releases, and interviews with key opinion leaders and will participate in the planning and creation of the biweekly publication, Drug Topics. Students will develop familiarity with creative aspects of magazine publication procedures and further improve their medical/scientific writing and literature evaluation skills.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*On Occasion*

**PH 645 Medical Education/Communication Advanced Pharmacy Practice Experience**

Students in this elective advanced pharmacy practice experience will be assigned to a medical education company for a 5-week period. The goal of this experience is to enhance the student's knowledge, skills, and experiences in medical education/communications by immersing him/her in the development and delivery of educational programming and innovative means of providing healthcare information. The APPE helps students gain practical experience in educational program

development, needs assessment research, educational outcomes evaluation, educational content development and validation, and CME activity planning and development. All students receive training on the CME industry, which includes ACCME and other association guidelines. *The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*On Occasion*

**PH 646 Medical Communications and Marketing Advanced Pharmacy Practice Experience**

This advanced pharmacy practice experience helps students gain practical experience in the communication and marketing sectors of the healthcare industry. The students will be involved in developing marketing strategies and program solutions. This experience will provide them with an opportunity to participate in the creation of communication and/or marketing projects directed to healthcare professionals and/or patients. This 5-week experience will afford the student a glimpse into this alternative career pathway and expose and enhance the student's knowledge, skills, and experiences in medical communications and marketing through hands-on participation in development-to-delivery of agency projects.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*On Occasion*

**PH 650 Corporate Management Advanced Pharmacy Practice Experience**

This elective advanced pharmacy practice experience will serve to expose a pharmacy student to alternative career opportunities, provide insight into business decision making process, and define the skill sets necessary for management positions. Students are provided hands on training in the areas of human resources, store operations, loss prevention, field operations and management, regulatory affairs, and professional and college relations.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*On Occasion*

**PH 651 Health Outcomes Research Advanced Pharmacy Practice Experience**

With the rapid changes in the health-care environment, the roles of pharmacists have also become more diversified. Health outcomes research and software development is one such role. Pharmacists possess knowledge in pharmacotherapy, pharmacoeconomics, patient outcomes, and disease-state management that allow us to be valuable consultants to pharmaceutical companies, other health-care industry companies, and patients. This elective advanced pharmacy practice experience (APPE) will serve to expose pharmacy students to this stimulating alternative

career opportunity. The student will be introduced to the operations of a Health Outcomes Research and Software Development Firm. The student will learn and actively participate in business activities by acquiring skills in writing business proposals, performing market research, and attending new business presentations. A short-term written project, with presentation to staff and/or client, will be assigned to the student to evaluate his/her ability to perform literature searches, and exhibit his/her writing skills and oral presentation ability.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*On Occasion*

**PH 652 Information Technology in Healthcare Advanced Pharmacy Practice Experience**

This elective advanced pharmacy practice experience (APPE) will expose the student to the complex world of pharmacy informatics allowing him/her to learn the various development and implementation techniques used by information technology pharmacists to benefit healthcare provided in the facility. In addition, the student will learn how to evaluate the strengths and limitations of the current systems and develop methods to improve them.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*On Occasion*

**PH 654 Clinical Education Consultant - Field Based Industry Advanced Pharmacy Practice Experience**

In order to provide direct patient care, pharmacists need to develop critical thinking and communication skills so as to apply their extensive pharmaceutical and therapeutic knowledge effectively in a health care environment. This elective advanced pharmacy practice experience (APPE) will provide an opportunity for students to explore diverse roles and challenges faced by pharmacists in the changing face of the health care system within the United States. This APPE offers an opportunity to provide pharmacy consultative services to various health care "customers" including hospitals, long-term and skilled care providers, and managed care organizations. By spending five weeks in the field with the Pfizer Medical Outcomes Specialist, the student will gain a better understanding of this career opportunity.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*On Occasion*

**PH 655 Medication Safety Advanced Pharmacy Practice Experience**

This selective advanced practice experience provides opportunities for the student to learn and participate alongside various persons responsible for improving medication safety in the

hospital/medical center. These persons may include the director of medication safety, the director of pharmacy, and other administrative and clinical personnel. Students will have an opportunity to learn about different types of medication errors, factors that contribute to those errors, the severity of the errors, and the steps that go into their prevention. Students also will gain experience in collecting data on medication errors, analyzing the findings, communication with other health care professionals and administrators through a reporting mechanism, and tracking and trending an area of failure and success. Students will share the information obtained through various means such as a hospital-wide performance improvement initiative. Students may also have the opportunity to attend pharmacy and therapeutics committee meetings, interdepartmental performance improvement meetings, and monthly hospital-wide medication error rate reporting discussions.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*On Occasion*

#### **PH 656 Pharmacovigilance Advanced Pharmacy Practice Experience**

This advanced pharmacy practice experience (APPE) consists of five weeks in a pharmacovigilance department within a pharmaceutical company. This experience will enhance the student's communication, presentation, and competency in screening for trends that can affect the safety and efficacy of a product. The student will be assigned to a specific therapeutic area and will work with the assigned therapeutic team. The student will be assigned a formal project to complete during the five-week period. The projects will involve researching special interest topics, conducting drug/disease therapy evaluations (DTE), and providing formal and informal presentations. The students will also participate in daily triage activity. Skills that will be developed throughout this APPE (depending on the specific projects that come along) may include technical proficiency with Microsoft PowerPoint, Microsoft Excel, Clintrace (safety database), presentation abilities, data analysis, drug information source retrieval, technical writing, communication skills and general problem solving/critical thinking. Students will be able to meet and attend department meetings and become familiar with other departments within the company.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*On Occasion*

#### **PH 657 Medication Therapy Management Advanced Pharmacy Practice Experience**

The Medication Therapy Management Advanced Pharmacy Practice Experience is designed to provide the student pharmacist with the

opportunity to develop and use skills based on the knowledge acquired in previous courses, with an emphasis on identifying and resolving medication-related problems. Following the MTM service model, the student will learn safe and effective medication use and the patient-centered process of assessing and evaluating a medication regimen, while collaborating with physicians and other healthcare professionals.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*On Occasion*

#### **PH 680 Traumatic Brain Injury Rehabilitative Advanced Pharmacy Practice Experience**

The rehabilitative process in patients who are traumatic brain injured (TBI) is complicated and requires a dedicated interdisciplinary staff to achieve success. Medications as well as non-pharmacological therapies are a significant part of this process. The need for frequent medication changes and dosage adjustments make this an ideal setting for a pharmacist, and thus offers a unique experience for pharmacy students. This elective advanced pharmacy practice experience will prepare the student for an entry-level position helping to treat patients with traumatic brain injuries.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*On Occasion*

#### **PH 681 Oncology Pharmacotherapy Advanced Pharmacy Practice Experience**

This elective advanced pharmacy practice experience (APPE) provides opportunities for students to develop an understanding of the pathophysiology and pharmacotherapy of oncological diseases with an emphasis on commonly occurring tumors such as breast, lung, colon, and lymphomas and leukemias, in an inpatient and/or outpatient setting. Experience will be gained in the collection, interpretation and application of patient specific data as well as data from the published literature, which are used to assist with the design and implementation of therapeutic chemotherapeutic regimens as well as supportive care treatment approaches. This APPE will prepare the student for an entry-level position helping to treat patients with various forms of cancer.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*On Occasion*

#### **PH 683 Nuclear Pharmacy Elective Advanced Pharmacy Practice Experience**

The nuclear pharmacy elective advanced pharmacy practice experience (APPE) provides opportunities for students to develop an in-depth understanding of nuclear pharmacy as a specialty and practice same under the tutelage of a practicing nuclear

pharmacist. The student also will gain a perspective into the unique regulatory aspects of radiation safety in nuclear pharmacy and external customers. After completing this experience, the student will be able to do the following: identify, evaluate, resolve, and provide clinical support to external customers in relation to patient care.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*On Occasion*

#### **PH 688 Literature Evaluation in Peer Reviewed Medical Publishing Advanced Pharmacy Practice Experience**

This advanced practice experience consists of five weeks at Excerpta Medica, during which time the student will learn the peer review process for the journals Clinical Therapeutics and Current Therapeutic Research, and will have an opportunity to practice these learned skills. The student will review critiques prepared by outside reviewers, will perform critical evaluations of manuscripts submitted for publication, and will provide constructive criticism to the original authors. The student will communicate to the authors all the recommended changes in a professional, respectful but direct and clear manner. The student will review revised manuscripts to determine if the authors have responded appropriately to the reviewer's recommendations for changes to the manuscript and will then make a recommendation to publish or reject the revised manuscript. Students will develop familiarity with management and editorial aspects of the journals.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*On Occasion*

#### **PH 696 International Pharmacy Practice and Public Health Advanced Pharmacy Practice Experience**

Students in the APPE will be provided with an opportunity to learn and experience first-hand public health, health policy, health system, healthcare delivery and health programs in various international locales by interacting with healthworkers, students and faculty. The goal of this APPE is to enhance the student's knowledge, skills, and experiences of delivering pharmaceutical care in challenging and traditionally underserved environments and to develop an appreciation of the workings of national-international partnerships in addressing specific health problems such as malaria and maternal/child health in developing countries. Permission of Instructor required.

*Credits: 2.50*

*On Occasion*

#### **PH 697 Pharmaceutical Drug Analysis and Research Advanced Pharmacy Practice Experience**

This APPE will provide an opportunity for the student to participate in several aspects of the daily

activities of a research pharmacy. Through interaction with research pharmacists and other professionals, the student will gain an initial exposure to the drug preparation process and/or pharmaceutical assessment research in general. The student will learn various experimental techniques commonly employed in his/her assigned research area. Working under the direction of research pharmacist, the student will be introduced to various research issues such as Current Good Manufacturing Practice (CGMP) guidelines, maintaining a laboratory book and data analysis techniques. Pass/Fail.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*On Occasion*

### **PH 698 Advanced Pharmacy Practice Experience - Research**

Throughout this five week elective APPE the pharmacy student will be taking an active role in ongoing research as directed by a faculty member or non-faculty member preceptor. The specific area of research may or may not be a traditional career path in pharmacy. Students will learn what is involved in the research process including the proper methods or technique required to conduct research. This APPE provides a unique opportunity for students to learn about the research process while being able to explore in greater depth a particular area of interest. Pass/Fail.

*The pre-requisites of PH 300, 311, 312 and 413 are required.*

*Credits: 5*

*On Occasion*