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Statement

The College of Pharmacy and Health Sciences commits to academic excellence, scholarship and service to humanity through the discovery and application of biomedical knowledge.

We facilitate and advance scholarship by offering innovative programs of study utilizing active learning approaches that are student centered, outcomes-oriented and that inspire lifelong learning.

As compassionate health care professionals and scientists, we serve humanity through our dedication to excellence in health care and biomedical research. Building on a commitment to cultural diversity and benefiting from our metropolitan location and strategic alliances with the leading health care institutions, we strive to serve as effective leaders, good citizens and moral and ethical individuals.

We commit ourselves to the discovery, communication and application of biomedical knowledge as a critical component for the development of health care professionals and scientists. Through innovative basic, social and

clinical research initiatives, we contribute to scientific knowledge, address contemporary health care issues and seek solutions to health care problems.

Our mission embodies the principles of the University's mission statement: to provide a quality education in an environment that is Catholic, Vincentian and metropolitan.

Objectives

The Graduate Division of the College of Pharmacy and Health Sciences, in harmony with the mission of the University, prepares students for positions in industry, health care facilities, pharmacy practice, governmental agencies and education. The College provides an opportunity for students to develop and maintain scholarly growth in the pharmaceutical, industrial, biomedical and administrative sciences. In order to meet these objectives, the College offers programs at the master's level in pharmaceutical sciences, toxicology, public health, pharmacy administration, and physician assistant. Thesis and non-thesis options are available in all programs leading to the Master of Science degree except the specialty track in Biological and Pharmaceutical Biotechnology. Master of Science degrees in Pharmacotherapeutics and regulatory affairs/quality assurance (non-thesis only). In addition, an interdisciplinary professional science Master's program in Biological and Pharmaceutical Biotechnology is offered jointly with St. John's College of Arts and Sciences.

The College of Pharmacy and Health Sciences also offers a program of study in pharmaceutical sciences leading to the Doctor of Philosophy degree.

Master of Science Degrees

Programs of Study

The programs leading to the Master of Science degree are designed to enable individuals to be skilled in the areas of pharmaceutical sciences, toxicology, basic and applied biomedical sciences and pharmacy administration. Graduates are prepared for positions in industry, research, education and health care settings. Master's students are equipped with the skills to interpret and critically review research and integrate theoretical knowledge to provide solutions to practical problems.

The Graduate Division of the College of Pharmacy and Health Sciences offers the following programs of study leading to the Master of Science degree:

Biological and Pharmaceutical Biotechnology Pharmaceutical Sciences

Specialization in: Industrial Pharmacy;
Medicinal Chemistry; Pharmacology;
Pharmacotherapeutics

Pharmacy Administration

Specialization in: Pharmaceutical Marketing;
Regulatory Affairs/Quality Assurance

Physician Assistant Program

Toxicology

Entrance and Degree Requirements

Applicants with strong credentials in the sciences are considered for admission to the master's programs. All applicants to the master's programs (except for the Physician Assistant Program, please see specific program requirements in next section) must submit scores from the Graduate Record Examination, two letters of recommendation and a statement of goals in support of their application. Other specific requirements depend on the particular degree program chosen by the student. Graduate students who have certain deficiencies in their undergraduate curriculum may be required to enroll in graduate or undergraduate courses to remedy these deficiencies. These remedial courses provide no credit towards the master's degree. Students are notified of the specific requirements upon acceptance into the program.

Program Requirements

Pharmaceutical Sciences

Students who plan to undertake graduate work in the master's programs in pharmaceutical sciences must hold an appropriate baccalaureate degree with a major in pharmacy, nursing, or physicians assistant is required. For graduate study in pharmaceutical sciences with a specialization in pharmacotherapeutics, a baccalaureate degree with a major in pharmacy, nursing is required.

Pharmacy Administration

For graduate study in pharmacy administration applicants should possess a baccalaureate degree in pharmacy; however, those possessing a bachelor's degree in other areas are considered. The latter may be required to take certain undergraduate pharmacy administration courses in order to rectify any deficiencies.

Physician Assistant Studies

For graduate study in the Physician Assistant program, applicants must possess a baccalaureate degree from an accredited institution. Pre-requisite courses (must have been completed within five (5) years of admission into the program) include: General Biology with lab (2 semesters), General Chemistry with lab (2 semesters), Organic Chemistry with lab (2 semesters) (may substitute Biochemistry with lab for one Organic Chemistry course), Human Anatomy & Physiology with lab (2 semesters),

Microbiology, Behavioral Sciences (6 credits), English Composition, and Calculus (or higher level math). Applicants who attended a post-secondary institution in which English was not the language of instruction must also take the TOEFL.

Toxicology

Students who plan to undertake graduate work in the master's program in toxicology must hold an acceptable baccalaureate degree with a major in pharmacy or in one of the physical, chemical or biological sciences.

Double Master's Degree Program in Pharmaceutical Sciences and Library Science

Students with an appropriate bioscience background may apply for admission to the double master's program. The M.S. in pharmaceutical sciences is awarded with a specialization in pharmacology.

Degree Options

Two options are offered within most programs leading to the Master of Science degree. The thesis option requires 24 semester hours of coursework (exclusive of prerequisites) and a thesis project for which a minimum of six semester hours of research credit are required. Students that are accepted under the thesis option are permitted to take more than 24 semester hours of coursework subject to approval. The non-thesis option requires additional coursework in lieu of the thesis (a minimum total of 33 semester hours of coursework, exclusive of prerequisites). *Students are typically required to complete the degree program option (thesis or non-thesis) for which they have been accepted.*

Degree Requirements

Master of Science Programs (except physician assistant)

Residency*	One Year
Time Limit on Credit	Five Years
GRE Minimum Credit in Semester Hours:	Required 30 (24 Course work; 6 Thesis Research)
Thesis Option (Plan A)	
Minimum Credit in Semester Hours:	33 to 36
Non-Thesis Option (Plan B)	(Course work)
Comprehensive Examination	Required (for Plan B non thesis-only)

* *Residency for the Master's of Science degree requires completing a minimum of 12 credits over the first two consecutive semesters*

Double Master's Degree Program

Library Science	24 semester hours of credit
Pharmaceutical Sciences (Pharmacology)	21 semester hours
Exchange of credits applied toward the completion of both degrees	12 semester hours
Total	57 semester hours

Master of Public Health Degree

Program of Study

A 45-credit professional program leading to a Master of Public Health (MPH) degree is designed to provide graduate public health education centered in community issues and global issues. The MPH degree prepares graduates for diverse careers in positions such as program managers, community health educators, and program planners. Specializations in: community health or global health.

Entrance Requirements

Students interested in the Master of Public Health program must hold a baccalaureate degree and submit the appropriate documentation to be considered for admission including: official transcripts (minimum 3.0 grade point average on a 4.0 scale), two letters of recommendation, a current resume or curriculum vitae, official Graduate Record Examination scores, and a personal statement (up to 1,000 words) outlining interest in the field of public health, career goals, overview of any relevant public health experience, and reasons for pursuing an MPH degree at St. John's.

Degree Options

The Master of Public Health degree requires 45 credit hours of coursework including a culminating experience in which students submit a major written paper.

Degree Requirements

For graduate study in public health, students must complete a total of 45 credit hours to satisfy the degree requirements. All students complete 18-credit hours that cover the core discipline areas of public health (biostatistics, environmental health sciences, epidemiology, health services administration, and social and behavioral sciences), 12 credit hours of concentration courses, 9 credit hours of

methods and evaluation electives, a 3-credit hour fieldwork practice experience, and a 3-credit hour culminating experience. The MPH degree can be completed on a full-time basis in two years (including summer matriculation) or on a part-time basis in up to five years.

Master of Science in Physician Assistant Degree Program of Study

Physician assistants are nationally certified and state licensed medical professionals who practice medicine on healthcare teams with physicians and other providers to deliver competent, high-quality, patient-centered health care (American Academy of Physician Assistants). The entry level Master of Science in Physician Assistant (PA) degree is an 84-credit professional program that prepares graduates to practice direct patient care in diverse medical specialties ranging from primary care, to urgent and emergency medicine as well as specialty surgical and medical practices. The graduate level curriculum is divided into four semesters of didactic instruction followed by 50 weeks of clinical rotations at affiliated hospitals, private offices and community clinics. These rotation sites offer training in many disciplines of medicine and opportunity for exposure to a wide variety of patient populations with special focus on the Vincentian mission of commitment to providing care to medically underserved populations. Technical standards, as distinguished from academic standards, refer to the minimum cognitive, professional and behavioral abilities required for a student to satisfactorily complete of all essential aspects of the curriculum. All students will be required to read and sign the technical standards document to indicate they understand these qualifications.

Entrance Requirements

Students interested in the Master of Science in Physician Assistant program must satisfy the following requirements:

- Completed Baccalaureate degree from an accredited institution
- A minimum overall GPA and cumulative math/science GPA of 3.0 (on a scale of 4.0)
- For applicants who have not attended high school or college in the United States or other English speaking country, the Test of English as a Foreign Language (TOEFL) examination is required with a minimum examination score of (paper-based – 550), (computer-based – 230) or (internet-based – 88). International applicants must provide notarized English translations of all academic transcripts and any documentation pertaining to educational history.

- Successful completion of the following prerequisites at an accredited institution no more than 5 (five) years prior to application to the program with minimum 3.0 GPA:
 - General biology with lab – 2 semesters or 8 credits
 - General chemistry with lab – 2 semesters or 8 credits
 - Human Anatomy and Physiology 1 & 2 with one lab – 2 semesters
 - Microbiology – 1 semester
 - Organic chemistry with lab – 2 semesters (may substitute one semester of organic chemistry with biochemistry lab)
 - Behavioral sciences – 6 credits
 - English composition – 1 semester
 - Calculus or above – 1 semester

Applicants must submit the appropriate documentations to be considered for admission including: official transcripts, three letters of recommendation from professionals (academic or occupational – one must be from a healthcare professional) and a personal statement (500 word minimum) describing why the applicant wishes to become a physician assistant. A personal interview is required. No advanced placement or credit for experiential learning will be considered. Relevant healthcare experience is strongly recommended.

Application

Applicants must apply to the program through the Centralized Application Service for Physician Assistants (CASPA) online at www.caspaonline.org (portal opens every April of the year prior to matriculation). The applicant will also be required to submit an application to St. John's University Office of Graduate Admission. Candidacy for the program will be based on review of the CASPA and St. John's applications. Admission to the program is competitive. The accreditation mandated total number of seats for each class is 75 students.

Academic Standing

Students are required to achieve a semester AND cumulative grade point average of 3.0 along with earning a minimum of B in each course, to remain in good academic standing and progress in the program. Students who receive one course grade of B- may be in jeopardy of lowering their GPA below a 3.0 however, may progress to the next semester if their GPA is at or above 3.0. Any student who receives two grades of B- in any graduate course or rotation is considered to have an academic deficiency but may progress in the program ONLY if their semester AND cumulative GPA is >3.0. If a student receives two (2) grades below B in any graduate course or rotation and their semester GPA and/or cumulative GPA is below a 3.0, the student will be recommended for dismissal from the program. **A student who earns**

a third grade below B in any graduate course or rotation, REGARDLESS of their GPA, will be recommended for program dismissal. Students who fail any graduate course or rotation with a grade less than B- (F) will not be permitted to re-take the course or rotation and will be recommended for dismissal from the program.

Additionally, students are required to pass a cumulative competency exam at the end of their second didactic year in order to progress to the clinical year.

Grading System

Grade	Points
A:	4
A–	3.7
B+	3.3
B	3
B–	2.7
F	0

Please note: all courses within the program are either co-requisites and/or pre-requisites for other courses. Therefore, if a student wishes to withdraw for any reason, s/he must do so from the entire semester and program.

Doctor of Philosophy Degree

The program in pharmaceutical sciences leading to the Doctor of Philosophy degree prepares graduates for leadership roles in meeting the evolving needs in pharmaceutical and biomedical education, research and industry. The Doctor of Philosophy degree program is offered with areas of specialization in:

- Industrial Pharmacy
- Pharmacology
- Toxicology
- Medicinal Chemistry

Entrance Requirements

An applicant seeking acceptance in the Doctor of Philosophy program must have completed an appropriate baccalaureate or master's degree program. This degree must be in the natural or physical sciences and may include degrees in the pharmaceutical sciences, toxicology, biology or chemistry. Other degree areas are considered on a case-by-case basis by the Admissions Committee.

- Basic minimum requirements for a student with an undergraduate degree include:
 - a) An undergraduate grade point average of 3.5 or better
 - b) Suitable Graduate Record Examination (General Exam) scores
 - c) Two letters of recommendation

- Basic minimum requirements for a student with a suitable master's degree include:
 - a) A graduate grade point average of 3.0 or better
 - b) Suitable Graduate Record Examination (General Exam) scores
 - c) Two letters of recommendation

Prior to registration, the student must receive written confirmation from the Office of Admission as to the approval of matriculation in the doctoral program. Post-M.S. courses completed prior to acceptance in the Ph.D. program may not be applied toward the Ph.D. degree requirements. The admissions committee may require that certain deficiencies be remedied during the first year of the Ph.D. program. Admission to the doctoral program does not imply advancement to candidacy for the degree. Additional requirements, including satisfactory completion of the core curriculum, passing the comprehensive examination, passing the oral presentation of the research proposal and the establishment of the Ph.D. research committee must be fulfilled before a graduate student may be considered a candidate for a degree. The Ph.D. research committee is responsible for assisting the candidate in his/her research, but the primary responsibility for successfully completing the research and dissertation rests with the candidate.

Students must take PAS 265 Scientific Inquiry: Regulation and Ethical Challenges on a Pass/Fail basis. These credits do not apply toward degree.

Program of Study

The program of study consists of a minimum of 60 semester hours beyond the bachelor's degree. For those holding a Master's degree, a lower remaining credit load exclusive of prerequisites but inclusive of dissertation research may be granted. The letter of admission may state a maximum reduction to 30 semester hours remaining exclusive of prerequisites but inclusive of dissertation research. The coursework for each student consists of a core curriculum and a specialization curriculum that is determined in consultation with the faculty mentor.

Curriculum

Core Curriculum:	Credits
PHS 212 Applied Biopharmaceutical Chemistry	3 cr.
or	
IPP 241 Advanced Biopharmaceutics	3 cr.
PAS 252 Biostatistics	3 cr.
PHS 251 Seminar in the Pharmaceutical Sciences	0 cr.
PHS 252 Seminar in the Pharmaceutical Sciences	0 cr.

PHS 253 Seminar in the Pharmaceutical Sciences	0 cr.
PHS 254 Seminar in the Pharmaceutical Sciences	1 cr.
PHS 256 Pharmaceutical Analysis Laboratory	3 cr.
Total	10 cr.

All core requirements must be completed within the first two years of study. The specific curriculum for a specialization area will be determined in consultation with the doctoral student's faculty mentor.

Degree Requirements

Residency 24 credits or equivalent in a 24-month period (including summer)

Time Limit on Credit Seven years

Minimum Credit in Semester

Hours 15 credits of coursework beyond the M.S. degree plus basic requirements in area of specialty subject to the Doctoral Committee; 45 credits of course work beyond the baccalaureate degree.

Comprehensive Examination Required

Graduate Record Examination Required

Dissertation Research Minimum of 15 credits of Dissertation Research (PHS 950)

Thesis and Dissertation Research

All candidates for the Ph.D. degree must conduct an original laboratory investigation. All master's students electing the thesis option, must conduct an original laboratory, administrative or clinical investigation. The results are reported in the form of a written dissertation that must be presented and defended at an oral examination. All thesis and dissertation candidates must take the appropriate 900-level research course each semester from completion of comprehensive examination requirements up to and including the semester in which the thesis or dissertation is defended. All laboratory research must be conducted at the University, unless explicitly authorized by the Ph.D. or master's committee.

Examinations and Grading

Graduate degree requirements for all programs include a required number of course credits with satisfactory grades indicative of scholarship. All master's students must take and pass a comprehensive examination. However, master's students that are enrolled

in the thesis option (Plan A) must satisfy the comprehensive examination requirement by completing a research project and submitting and orally defending the written thesis.* Ph.D. students are required to take and pass a comprehensive examination. Ph.D. students must also complete a research project and submit and successfully orally defend a written dissertation. Ph.D. students should consult the Doctoral Handbook of their degree for further details concerning degree requirements.

*M.S. students should consult further with program-specific policies such as the M.S. degree handbooks which may provide further details.

Academic Standing

Students in the graduate programs are required to receive at least a "B" grade in all courses. If a student receives a grade of less than a "B", or their G.P.A. falls below 3.0, the student's program will automatically become subject to review. Such a review may result in academic dismissal. Master's students who receive more than two grades less than "B" are typically considered for academic dismissal. Ph.D. students who receive more than one grade less than "B" are typically considered for academic dismissal. Ph.D. students should consult the Doctoral Handbook of their degree for further details concerning degree requirements

The Health Education Resource Center

HERC is open weekdays in the Sister Jane M. Durgin Pharmacy Education Center of St. Augustine Hall, Room B22. This instructional resource center provides educational and technical services to support the course objectives of the College of Pharmacy and Health Sciences. The center features a specialized collection consisting of books, periodicals, media, and electronic resources in the primary subject specialties of pharmacy and health sciences. The students, faculty, alumni, and practitioners of the college are also provided with a number of services at the center, which include: reference and research support, document delivery, public work stations, and quiet study areas. The center also sponsors educational programs, led by leaders from the fields of pharmacy and health sciences, which focus on contemporary healthcare issues.

Clinical Health Professions Course Offerings (CHP)

John Conry, Pharm.D., Chair and Clinical Professor

Objectives

The department seeks to provide students with the opportunity to acquire the knowledge, develop the attitudes and master the skills required for contemporary clinical pharmacy practice.

Lectures, utilization of the multimedia programs in the Resource Center, and individual and group conferences with faculty and preceptors give the student the opportunity to acquire the knowledge base required to be a drug advisor on the health care team.

By participation in health care settings throughout the curriculum and through interactions with patients, physicians, nurses, paraprofessionals and pharmacists, assistance is given to the student to develop the professional attitudes and acquire the communication techniques and skills that are prerequisites for health practitioners who wish to apply academic knowledge to practical situations.

Utilization of the Pharmacy Practice and Patient Assessment Laboratories and primary health care settings, including community pharmacies, allows the student to become familiar with the legal, administrative and clinical aspects of successful pharmacy practice.

In addition, other clinical training sites are utilized as resources for student instruction in therapeutic drug monitoring, provision of drug information and patient interviewing and education. These include major metropolitan area medical centers, community hospitals and clinics, and institutions emphasizing the care of specific patient populations (e.g., pediatric, psychiatric, geriatric care).

Physician Assistant Course Offerings (PAE)

PAE 101 Introduction to the Physician Assistant Profession and Ethics

This course is designed to provide the Physician Assistant (PA) student with an introduction to the Physician Assistant profession and Behavioral Medicine. The course will include the history of the profession, role development, orientation to professional organizations and accrediting agencies, medical-legal aspects of dependent provider practice, and medical ethics. The student will gain knowledge in best practice approaches to patient care specific

to physician assistant practice including communication techniques, patient management, patient education, and behavioral medicine skills. The students will be able to recognize and assess psychosocial dynamics and cultural diversity in healthcare including financial and healthcare delivery systems. Attention will be paid to biological, cultural, and psychosocial perspectives of behavior as related to patient presentation, medical care, and the scope of practice for the physician assistant. The students will gain knowledge to critically reflect on the role of the PA practitioner in general practice and behavioral medicine settings. *3 semester hours.*

PAE 102 Current Topics in Physician Assistant Practice

This course is a seminar course for all students pursuing a degree in Master of Science in Physician Assistant. The discussion will expose the student to practicing physician assistant educators and physician assistant clinicians to current issues, ethical dilemmas, new developments in the field and professional issues related to clinical practice. Seminar: *0 semester hours.*

PAE 207 Medical Diagnostics

This course is designed to introduce the Physician Assistant (PA) student to various diagnostic imaging studies, clinical chemistry theory, and laboratory assessment. Teaching emphasis is placed on pathophysiology, patient presentations, indications for diagnostic testing, characteristics of specific procedures, interpretation of laboratory or imaging results, the techniques, advantages, disadvantages, benefits, and risks of various procedures, and treatments. This course will incorporate interdisciplinary instruction integrated from clinical medicine. Instruction is provided by faculty from varied areas of expertise and experience. Emphasis is placed on case-based clinical assessment, association of abnormal laboratory and imaging results with specific diseases, and the correlation of enzymes to body systems and organ dysfunction. This course serves to blend lecture-based education with problem-based clinical experiences, patient factors and applications of best evidence to create competent, up-to-date healthcare professionals. *2 semester hours.*

PAE 201 Clinical Medicine 1

Prerequisite: All prerequisite courses to the professional phase of the PA program. This course is designed to instruct the PA student in the areas of human health and disease in immunology, dermatology, gastroenterology, and endocrinology. Teaching emphasis will be a sequential method of instruction relevant to the epidemiology, etiology, pathophysiology, clinical manifestations, diagnosis, treatment, clinical pharmacological applications, complications and prognoses of selected

disease states. This course will incorporate interdisciplinary instruction utilizing faculty from varied areas of expertise and experience. Emphasis is placed on case-based clinical therapeutics and patient education regarding drug administration, potential adverse effects and drug interactions. *4 semester hours.*

PAE 202 Clinical Medicine 2

Prerequisite: All prerequisite courses to the professional phase of the PA program. This course is designed to instruct the PA student in the areas of human health and disease in psychiatry, community medicine, ophthalmology, EENT, and pulmonology. Teaching emphasis will be a sequential method of instruction relevant to the epidemiology, etiology, pathophysiology, clinical manifestations, diagnosis, treatment, clinical pharmacological applications, complications and prognoses of selected disease states. This course will incorporate interdisciplinary instruction utilizing faculty from varied areas of expertise and experience. Emphasis is placed on case-based clinical therapeutics and patient education regarding drug administration, potential adverse effects and drug interactions. *4 semester hours.*

PAE 206 Comprehensive Health History and Physical Diagnosis

This course is designed to develop the cognitive, psychomotor and affective attributes in the PA student for identifying and describing normal human anatomy, recognizing normal vs. pathological clinical manifestations, obtaining a medical history, performing a screening physical examination and recording findings as medical-legal documents. Teaching emphasis will be a sequential method of instruction relevant to the structure and function of body systems, common pathophysiology and clinical manifestations and physical examination demonstration. This course will incorporate interdisciplinary instruction utilizing faculty from varied areas of expertise and experience. Emphasis is placed on communication skills, cultural sensitivity, professionalism and standardization of medical record documentation. Students will demonstrate acquisition of skills during supervised hospital visits and practical examinations, and will begin to incorporate assessment and management plans into patient care. *4 semester hours.*

PAE 203 Clinical Medicine 3

Prerequisite: All prerequisite courses and fall courses in the professional phase of the PA program. This course is designed to instruct the PA student in the areas of human health and disease in neurology, cardiology, hematology-oncology, and GU/nephrology. Teaching emphasis will be a sequential method of instruction relevant to the epidemiology, etiology, pathophysiology, clinical manifestations, diagnosis, treatment, clinical pharmacological applications,

complications and prognoses of selected disease states. This course will incorporate interdisciplinary instruction utilizing faculty from varied areas of expertise and experience. Emphasis is placed on electrocardiogram interpretation, case-based clinical therapeutics and patient education regarding drug administration, potential adverse effects and drug interactions. *4 semester hours.*

PAE 204 Clinical Medicine 4

Prerequisite: All prerequisite courses and fall courses in the professional phase of the PA program. This course is designed to instruct the PA student in the areas of human health and disease in pediatrics, women's health, and geriatrics. Teaching emphasis will be a sequential method of instruction relevant to the epidemiology, etiology, pathophysiology, clinical manifestations, diagnosis, treatment, clinical pharmacological applications, complications and prognoses of selected disease states. This course will incorporate interdisciplinary instruction utilizing faculty from varied areas of expertise and experience. Emphasis is placed on special procedures in diagnostic imaging, as well as promotion, prevention, maintenance, and protection of health and wellness of individuals and communities to include social and economic determinants of health and common medical problems that are frequently encountered in urban settings. Teaching will also utilize case-based clinical therapeutics and patient education regarding drug administration, potential adverse effects and drug interactions. *4 semester hours.*

PAE 205 Clinical Medicine 5

This course is designed to provide the Physician Assistant (PA) student with an orientation to general surgery, orthopedics, rheumatology, and Infectious disease specific to the scope of practice for the physician assistant. Baseline knowledge will also focus on synthesizing instruction gained in clinical medicine health history and physical diagnosis (HHPD), anatomy and physiology, diagnostic imaging, pharmacological applications, and laboratory medicine to correlate presentation of surgical and orthopedic problems, illness, disease, and normal variants. The student will learn to discern routine, urgent, and emergent injuries or illness from a surgical perspective and formulate surgical treatment plans including pre-operative, operative, and post-operative management and associated issues unique to the surgical patient. The laboratory sessions will include video demonstration and hands-on practical instruction of venipuncture, gastrointestinal (GI), instrumentation, genitourinary (GU) instrumentation, suturing, splinting and casting. *4 semester hours.*

PAE 208 Emergency Medicine

Prerequisite: All prerequisite courses and fall courses in the professional phase of the PA program. This course is designed to instruct the PA student in the emergency department

approach to medical care, including triage techniques, prioritization and consultation relevant to a variety of patient conditions. The student will incorporate knowledge of the epidemiology, etiology, pathophysiology, clinical manifestations, diagnostics and management of disease states to treat focused emergency problems. Emphasis will be placed on recognizing and treating conditions that are potentially life-threatening requiring urgent or emergent intervention inclusive of emergency techniques. This course will incorporate interdisciplinary instruction utilizing faculty from varied areas of expertise and experience. *2 semester hours.*

PAE 305 Emergency Medicine Rotation

Prerequisites: All required didactic year classes and successful completion of comprehensive examinations. This course is a five-week rotation in a hospital or urgent care ambulatory setting. The student will be introduced to the triage system to learn and develop the skills necessary to perform the primary survey and stabilization of patients in the acute setting. The student will perform focused history and physical exams, generate differential diagnoses and develop therapeutic treatment plans for adult and pediatric patients with urgent or emergent conditions, as well as provide ambulatory or "fast-track" care. This includes diagnostic testing, medications and non-pharmacological treatment interventions. The student will also demonstrate and perform practical medical-surgical procedures including CPR and BCLS skills. The student will recognize the need for consultation and referral in provision of cost-effective urgent and emergent care, including acute and chronic disease management, health promotion, disease prevention and routine healthcare maintenance, with an emphasis on health literacy issues. *Rotation, 200 hours; 3 semester hours.*

PAE 306 Women's Health Rotation

Prerequisites: All required didactic year classes and successful completion of comprehensive examinations. This course is a five-week rotation in a hospital inpatient or ambulatory setting, which may include outpatient, emergency room, or office-based clinical duties of gynecological or obstetrical patients. The student will perform comprehensive history and physical exams, generate differential diagnoses and develop therapeutic treatment plans for patients with gynecological and obstetrical conditions. This will include diagnostic testing, medications and nonpharmacological treatment interventions, including recognizing the need for consultation and referral. Experiential learning will include provision of cost-effective adult medical care, including acute and chronic disease management, health promotion, disease prevention and routine healthcare maintenance. The student will provide patient education with an emphasis on health literacy issues. The student may

have the opportunity to participate in surgical gynecological or obstetrical procedures. *Rotation, 200 hours; 3 semester hours.*

PAE 308 Orthopedic Rotation

Prerequisites: All required didactic year classes and successful completion of comprehensive examinations. This course is a five-week rotation in a hospital, ambulatory or office based orthopedic setting. The student will perform comprehensive history and physical exams, generate differential diagnoses and develop therapeutic treatment plans for acute and chronic problems in orthopedic patients across all age groups. This rotation may include surgical management including pre-operative, intra-operative, and postoperative orthopedic care. Students will order diagnostic tests and medications and recommend non-pharmacological treatment interventions for the orthopedic patient. The student will demonstrate and perform practical splinting, casting, and surgical procedures and skills. The student will recognize the need for consultation and referral in provision of cost-effective orthopedic care, including acute and chronic disease management, health promotion and safety, disease prevention and routine healthcare maintenance. The student will provide patient education with an emphasis on cast/ immobilization techniques, safety and health literacy issues. *Rotation, 200 hours; 3 semester hours.*

PAE 309 Pediatrics Rotation

Prerequisites: All required didactic year classes and successful completion of comprehensive examinations. This course is a five-week rotation in a hospital or office based pediatric setting. The student will perform comprehensive history and physical exams, generate differential diagnoses and develop therapeutic treatment plans for pediatric patients with acute and chronic pediatric problems and well child visits and school/camp exams. This will include diagnostic testing, medications and nonpharmacological treatment interventions. The student will recognize the need for consultation and referral in provision of cost effective infant, pediatric, and adolescent medical care, including acute and chronic disease management, health promotion, disease prevention and routine healthcare maintenance. The student will provide patient education with an emphasis on growth and development and health literacy issues. *Rotation, 200 hours; 3 semester hours.*

PAE 302 Primary Care 1 Rotation

Prerequisites: All required didactic year classes and successful completion of comprehensive examinations. This course is a five-week rotation in an ambulatory or outpatient hospital or office-based primary care medical setting. The student will perform comprehensive history and physical exams, generate differential diagnoses and develop therapeutic treatment plans for patients

with acute and chronic medical problems, including diagnostic tests, medications and non-pharmacological treatment interventions. The student will recognize the need for consultation and referral, transfer to an emergency or acute care setting in provision of cost-effective medical care, including acute and chronic disease management, health promotion, and patient education. The student will provide patient education, disease prevention and routine healthcare maintenance across all age groups with an emphasis on health literacy issues. *Rotation, 200 hours; 3 semester hours.*

PAE 310 Elective Clinical Rotation

Prerequisites: All required didactic year classes and successful completion of comprehensive examinations. This course is a five-week rotation in a specialty of the student's choice that may take place in a hospital or office based setting. Elective rotations include but are not limited to the following: cardiology, gastroenterology, infectious disease, psychiatry, pulmonology, hematology-oncology, critical care, dermatology, occupational medicine, gay and lesbian health, and the physically and mentally challenged. The student will perform comprehensive or focused history and physical exams, generate differential diagnoses and develop treatment plans for patients with acute and chronic problems. This will include diagnostic tests, medications and non-pharmacological treatment interventions. The student will become familiar with the need and role of consultation and referral of patients, transfer to an emergency or acute care setting in the clinical setting through provision of cost-effective care, including acute and chronic disease management, health promotion, disease prevention and routine healthcare maintenance. The student will provide patient education with an emphasis on health literacy issues across all age groups as applicable to clinical site. *Rotation, 200 hours; 3 semester hours.*

PAE 304 Surgery Rotation

Prerequisites: All required didactic year classes and successful completion of comprehensive examinations. This course is a five-week rotation in a hospital inpatient setting, which may include outpatient or office based clinical duties. Student responsibilities include: performance of history and physical exams, formulation of differential diagnoses, therapeutic treatment plans across all age groups for patients with surgical problems, including pre-operative, intra-operative, and post-operative care. The clinical experience will also include ordering of diagnostic tests, medications and non-pharmacological treatment interventions and performance of diagnostic laboratory tests, and participation in surgical procedures (operating room). *Rotation, 200 hours; 3 semester hours.*

PAE 307 Geriatrics/Long Term Care Rotation

Prerequisites: All required didactic year classes and successful completion of comprehensive examinations. This course is a five-week rotation in a hospital or office-based geriatric setting. The student will perform comprehensive and focused history and physical exams, generate differential diagnoses and develop therapeutic treatment plans for adult and geriatric patients with medical or surgical conditions. This includes diagnostic tests, medications and non-pharmacological treatment interventions, while under the supervision of the preceptor. The student will recognize the need for consultation and referral, in provision of cost-effective geriatric care, including acute and chronic disease management, health promotion, health maintenance and disease prevention. The student will provide patient education with an emphasis on health literacy issues. Rotation, 200 hours; 3 semester hours.

PAE 303 Primary Care 2 Rotation

Prerequisites: All required didactic year classes and successful completion of comprehensive examinations. This course is a five-week rotation that continues the educational and experiential learning of the Primary Care 1 course in an ambulatory or outpatient hospital or office-based primary care medical setting for an additional five-week rotation. The student will perform comprehensive history and physical exams, generate differential diagnoses and develop therapeutic treatment plans for patients with acute and chronic medical problems. This will include diagnostic tests, medications and non-pharmacological treatment interventions. The student will recognize the need for consultation and referral, transfer to an emergency or acute care setting in provision of cost-effective medical care, including acute and chronic disease management, health promotion, disease prevention and routine healthcare maintenance. The student will provide patient education, disease prevention and routine healthcare maintenance across all age groups with an emphasis on health literacy issues. Rotation, 200 hour; 3 semester hours.

PAE 301 Internal Medicine Rotation

Prerequisites: All required didactic year classes and successful completion of comprehensive examinations. This course is a five-week rotation in a hospital or office-based internal medicine setting. The student will perform comprehensive history and physical exams, generate differential diagnoses and develop therapeutic treatment plans for patients with acute and chronic medical problems. The clinical experience will include diagnostic testing, medications and non-pharmacological treatment interventions including patient education with an emphasis on health literacy issues across all age groups. The student will learn to recognize the need for consultation and referral in provision of cost-effective adult medical care, including acute and chronic

disease management, health promotion, disease prevention and routine healthcare maintenance. Rotation, 200 hours; 3 semester hours.

Senior Competencies Component

Prerequisites: All required didactic year classes and successful completion of comprehensive examinations. This is a course is designed to supplement the clinical experience of the Physician Assistant student with appropriate learning sessions on callback days. While on clinical rotations, students will be performing comprehensive or focused history and physical examinations, generating differential diagnoses, ordering and interpreting laboratory and imaging studies and developing treatment plans for patients with acute and chronic problems under the supervision of the preceptor. Emphasis is placed on cost effective care, disease management and health promotion, disease prevention and routine healthcare maintenance. The student will gain and apply knowledge regarding epidemiology, risk factors, etiology, pathophysiology, clinical manifestations and the clinical assessment of medical and surgical diseases. Learning sessions on call back days are designed to augment student's knowledge and further develop and perfect their history taking, physical examination and procedural skills. Lecture. *Credit:* 0.

Department of Pharmacy Administration and Public Health (PAH)

Wenchen Wu, Ph.D., *Chair and Associate Professor*

Program of Study

The Department of Pharmacy Administration and Public Health (PAH) prepares students in the area of Pharmaceutical Marketing, Regulatory Affairs/Quality Assurance or Public Health. One objective is to prepare a student who is interested in specializing in the area of Pharmaceutical Marketing or Regulatory Affairs/Quality Assurance to demonstrate and communicate the quality and value of pharmaceutical/health care products and services in a competitive environment, while building the foundations for a career track in marketing, outcomes research, pharmaceutical regulations, and quality assurance. A successful student is then able to pursue employment in his or her chosen field and become a leader or seek career advancement in pharmaceutical industry, hospital, academia, government, research, and health care organization.

PAH also prepares students who are interested in pursuing a career in public health to improve and protect the health of populations by

performing an array of essential public health services. Students will have various opportunities to develop core public health competencies and specialize in either community health or global health. The Master of Public Health degree equips students with the skills to review, analyze, interpret and integrate research and knowledge to provide practical solutions to public health problems in local, national, and global communities. Graduates may pursue work in the public and private sectors, including local, state or federal health departments, community-based organizations or international agencies, in a variety of positions such as program planners, community health educators, global program managers, health promotion coordinators, and program evaluators.

MPH 204 Health Care System and its Financing

This course will provide an overview of those factors affecting the access disparity, efficiency and quality of the U.S. health care system. Students will gain an appreciation of the dilemmas confronting policy makers, providers, and the public, and how to balance the conflicting priorities in the current health care system. *3 semester hours, 3 credits.*

MPH 219 Healthcare Outcomes Assessment

The 3-credit course is designed to provide a comprehensive review of economic analysis and health status assessment in the appraisal of health outcomes and program effectiveness in health service research. Application of economic tools and quality of life evaluation instruments in clinical investigations, health services research, and policy analysis will be discussed. *3 semester hours, 3 credits.*

MPH 230 Urban Health

This course will introduce students to the impact of urbanization on health. The course will cover health disparities and health inequities in the context of an urban environment. It will address social determinants of health issues such as marginalization, disenfranchisement, poverty, housing, migration, environmental factors, as well as access to health care. The course will explore the intersection of the urban environment and its relation to governance and the development of regulations, evaluation strategies for designing healthy urban communities, and explore the development of recommendations to advance urban health systems. *Credit: 3 semester hours.*

MPH 252 Biostatistics

This course will allow the student to conceptualize the different statistical methods used to evaluate drugs and health care protocols used in clinical and non-clinical public health settings. The principal emphasis will be placed on data analyses involving human in observational and experimental studies in the health sciences, including public health. *3 semester hours, 3 credits.*

MPH 275 Introduction to Public Health Management

This course will introduce the student to the historical evolution of public health infrastructure and practice and provide an introduction to public health management. *3 semester hours, 3 credits.*

MPH 280 Introduction to Epidemiology

This course introduces students to the basic concepts of epidemiology as applied to public health problems. The course will examine how epidemiology contributes to assessing the health of the population, identifying the risk factors that may cause diseases and evaluating the procedures for studying and preventing diseases. *3 semester hours, 3 credits.*

MPH 285 Introduction to Environmental Health Sciences

Environmental health sciences represent the study of environmental factors including biological, physical and chemical factors that affect the health of a community. The overall role of environmental risks in the pattern of human disease, and the engineering and policy strategies, including risk assessment, will be introduced. *3 semester hours, 3 credits.*

MPH 301 Social and Behavioral Health

The course is designed to introduce the student to psychosocial concepts and processes that influence health status and public health interventions. The course will provide an introductory background to the kinds of social and behavioral theories that guide our understanding of health related behavior and explore some of the ways in which these theories and approaches may be used in public health practice. *3 semester hours, 3 credits.*

MPH 302 Health Care Data Analysis and Management

This course is designed to develop effective data management skills in clinical and health care research. The course will provide graduate students with an overview of statistical software and provide technical skills for data management, data analysis, and producing graphs and reports. *3 semester hours, 3 credits.*

MPH 303 Public Health Program Planning

The course is designed to provide students with a systematic approach to planning effective public health programs and will cover the general principles of public health program planning including needs assessment, design, implementation and evaluation. The student will be able to develop a plan for implementing an effective public health program and/or intervention to address public health issues affecting the communities at local, national, and international levels. *3 semester hours, 3 credits.*

MPH 304 Public Health Program Evaluation

This course will provide students with an overview of program evaluation, qualitative and quantitative evaluation methods and analysis tools to evaluate data. A critical examination of a wide variety of research and program evaluation designs and methods used in applied areas of health care will be evaluated. *3 semester hours, 3 credits.*

MPH 305 Geographic Information Systems (GIS)

This course is an introduction to the concepts of Geographic Information Systems (GIS) as they apply to public health, access to care and health disparities. Participants will acquire hands-on experience using type of GIS software to create and manage geo-referenced data layers; learn principles of geocoding and the use of Global Positioning Systems (GPS); perform queries, searches, and statistical

analyses; and create maps and reports for the field of public health. *3 semester hours, 3 credits.*

MPH 306 Research Methods in Public Health

The course will introduce the student to the fundamentals of research study design, data collection, data analysis and interpretation of study results in public health research or evaluation project. It serves as an introduction to various quantitative, qualitative, mixed method and participatory approaches for undertaking research on issues pertaining to public health and health services evaluation. *3 semester hours, 3 credits.*

MPH 310 Health Disparities

This course will introduce the concept of health disparities in relation to socioeconomic status (SES), access to care, racial and ethnic group in the United States. Students will compare health status across social, racial and ethnic groups and discuss the concept of socioeconomic status and its association between poverty and poor health. *3 semester hours, 3 credits.*

MPH 311 Health Promotion and Disease Prevention

The purpose of this course is to evaluate different approaches to health promotion and disease prevention for different target groups. The course focuses on the specifics of intervention both development and delivery and how these might vary across settings, behaviors and strategies. *3 semester hours, 3 credits.*

MPH 312 Health Communication (3)

The course is designed to help public health professionals apply sound judgment when making decisions about how to communicate effectively with the public. The course includes theoretical and practical content on: persuasive approaches to group and individual change; audience, message, and channel factors in campaign development; and measurement of campaign impacts. *3 semester hours, 3 credits.*

MPH 315 Global Health and Healthcare in Developing Countries

This course will explore factors that contribute to unequal prevalence of diseases and status of health and introduce key concepts of global health. The student will be introduced to the burden of diseases on the economic resources of developing countries; challenges faced by the global health systems, and economic and social inequity issues in global health. *3 semester hours, 3 credits.*

MPH 316 Global Environmental Sustainability and Health

The course explores the major issues pertaining to the maintenance of a sustainable ecosystem as an essential prerequisite for population growth without compromising the ability of the next generation to meet its needs. The course examines the current challenges in global

sustainability such as climate stabilization, energy security, and sustainable land use. *3 semester hours, 3 credits.*

MPH 317 Public Health Practice

Prerequisite: all core courses. Students will apply skills and knowledge acquired from their coursework in a real-world setting in this supervised fieldwork practice experience to address a public health issue. As students carry out the assigned projects, they will attend seminars and submit interim reports to document their progress towards goals and objectives. *3 semester hours, 3 credits.*

MPH 330 Culminating Experience

Prerequisite: MPH 317. The culminating experience provides continued development of the students' skills and helps advance the transition into knowledgeable public health professionals. This course is integrated with the fieldwork practice experience and requires application of the cross-cutting concepts and core areas of knowledge in which students plan, analyze, present their fieldwork experience and attend seminars. *Prerequisites: MPH 317 Public Health Practice. 3 semester hours, 3 credits.*

PAS 101 Special Problems

Prerequisite: Completion of 12 course credits. Laboratory and/or fieldwork in area of specialization in institutional, hospital, cosmetic or industrial pharmacy. *Credit: 3 semester hours.*

PAS 212 Pharmaceutical Promotion

This course deals with the theoretical, practical and unique aspects and issues in pharmaceutical promotion. *Lecture. 3 semester hours, 3 credits.*

PAS 214 Management in the Health Care Industries

Management policies and procedures of those institutions organized to deliver health care services and related products to the consumer. *3 semester hours, 3 credits.*

PAS 215 Foundations of Regulatory Affairs

This course provides the student with an understanding of the laws, regulations and procedures of federal and state regulations that affect drugs and medical devices during their development, production and distribution stages. *Lecture. 3 semester hours, 3 credits.*

PAS 216 Consumer Behavior in Purchasing Drug Products

Sociological, psychological and anthropological factors affecting consumer buying tendencies. *3 semester hours, 3 credits.*

PAS 217 Retail Pharmacy Management

This course deals with the theoretical and practical aspects of the activities involved in the retailing of pharmaceutical goods and services—specifically with respect to the places, times, prices and quantities that enable a retailer to reach its goals. *Lecture. 3 semester hours, 3 credits.*

PAS 218 Contemporary Administrative Principles

The evaluation of contemporary administrative concepts; the essentials of the planning, organizing, coordinating and controlling processes; and the techniques of interviewing, communicating, motivating and establishing performance criteria are explored in this course. *Lecture. 3 semester hours, 3 credits.*

PAS 220 Global Pharmaceutical Marketing

Prerequisite: PAS 211 or equivalent. This course covers the global pharmaceutical market and the economic, legal, cultural, political and competitive environment in which the global pharmaceutical market operates. *3 semester hours, 3 credits.*

PAS 252 Biostatistics

This course will allow the student to conceptualize the different statistical methods used to evaluate drugs and health care protocols used in clinical and non-clinical public health settings. While the principal emphasis will be placed on data analyses involving animal and humans in preclinical and clinical studies, case studies will involve the application of the concepts learned in the course to other health related fields including but not limited to public health. *3 semester hours, 3 credits.*

PAS 256 Principles of Experimental Design

Prerequisite: Undergraduate courses in biological and chemical sciences. This course is designed to develop competencies necessary to solve complex biological problems with efficient experiments using small sample size. *Lecture. 3 semester hours, 3 credits.*

PAS 260 Basic Concepts of Drug Development

This course is designed to study the modern drug development process in the pharmaceutical industry from drug discovery up to the Submission of NDA for FDA approval. *3 semester hours, 3 credits.*

PAS 261 Foundations of GXP

This course introduces the fundamental concepts of GLP, GCO and GMP. It explores basic regulatory and quality assurance issues pertinent to pre-clinical safety research. *3 semester hours, 3 credits.*

PAS 262 Regulatory Submissions and the Drug Approval Process

This course covers the development of IND and NDA submissions for FDA review. In addition, the most recently revised regulations governing IND, NDA, SNDA and ANDA are discussed as they relate to facilitation of the review process. *Credit: 3 semester hours.*

PAS 263 Generic Drug Regulation

Prerequisite: PAS 215. This course studies the FDA's regulations on generic drug manufacturing, clinical trial, application preparation and submission and marketing. It covers related guidance documents, policies, requirements and general procedures. *3 semester hours, 3 credits.*

PAS 264 Advanced Food and Drug Law Regulation

Prerequisite: PAS 215. This course develops an in-depth understanding of the laws governing food and drugs. This course focuses on the laws and regulations promulgated by the federal government, especially the Food and Drug Administration, related to drug development, manufacturing marketing and distribution. *3 semester hours, 3 credits.*

PAS 265 Scientific Inquiry: Regulation and Ethical Challenges

This course considers the nature of the scientific enterprise and both the legal and ethical restrictions placed on its methods and products by the government through imposition of regulation and society at large through moral suasion. *3 semester hours, 3 credits.*

PAS 266 Bio-Pharmaceutical Statistics-II

Prerequisites: PAS 252 or equivalent. This course will provide the student with explanation of the approaches and solutions to commonly encountered statistical problems, with examples that are relevant to scientists involved in pharmaceutical and related research. *3 semester hours, 3 credits.*

PAS 267 Post Approval Affairs

This course reviews FDA guidelines for Scale Up Post Approval changes (SUPAC) developed by the Center for Drug Evaluation and Research (CDER). The FDA guidelines, published workshop reports and applicable scientific literature will be discussed. *3 semester hours, 3 credits.*

PAS 268 Good Manufacturing Practices

This course will provide the students with a comprehensive understanding of the requirements described in the Food and Drug Administration's (FDA) regulations on GMPs as they pertain to pharmaceutical drugs and medical devices. *3 semester hours, 3 credits.*

PAS 269 Good Laboratory Practices

Prerequisite: PAS 261. This course is designed to provide an understanding of the regulatory requirements for designing, conducting, auditing, and reporting pre-clinical laboratory studies in support of research or marketing applications. It will explore the regulations and guidelines set forth by the US Food and Drug Administration (FDA), the European Union (EU) and other significant national regulations. *3 semester hours, 3 credits.*

PAS 272 Process Validation

This course will provide the students with an understanding of the scientific principles and regulatory requirements for pharmaceutical companies that are legally mandated to validate their manufacturing processes. *3 semester hours, 3 credits.*

PAS 275 Good Clinical Practices

Prerequisite PAS 261. This course is designed to provide an understanding of the quality standards for designing, conducting, recording,

and reporting clinical trials. It will explore the regulations and guidelines set forth by the U.S. Food and Drug Administration (FDA) and the International Conference on Harmonization (ICH) and briefly cover the impact of the European Union (EU) Clinical Trial Directive. *3 semester hours, 3 credits.*

PAS 276 International Drug Regulatory Affairs

This course provides a detailed analysis of the regulatory processes for new drug and device approvals outside of the United States. Students will gain experience in comparing the European, Canadian, Japanese, Asian and South American registration trends with those of the United States. Future regulatory structures in the major world markets will also be explored. *3 semester hours, 3 credits.*

PAS 277 Product Labeling

This course will examine strategies for creating drug labels and product labeling for new drugs and for dealing with labeling issues generated by post-marketing surveillance activities and alterations in federal Regulation or guidance. Students will gain insight into the regulatory process and the enforcement process of the FDA for drug, biologic, device, dietary supplement and cosmetic labeling. International labeling issues will be addressed as they impact on harmonization. *3 semester hours, 3 credits.*

PAS 278 Pharmaceutical Pricing Concepts and Research

The course is designed to introduce the student to the theories, principles and concepts in pharmaceutical pricing and pricing research. The course will provide an introduction to the principles and terminology that guide our understanding of pharmaceutical pricing and discuss research and methods that are used to develop pricing strategies in the United States. The course will also provide insights into the role of value and other healthcare and market variables (e.g., physician decision making, patient and disease characteristics) that influence pricing strategy development and pricing decisions for pharmaceutical medications. The role of these variables in shaping and developing pricing research will be discussed. Further, the influence of contracting/discounting and the tactical implementation of pricing will be discussed. *3 semester hours, 3 credits.*

PAS 279 Patient-Reported Outcomes Measures

This course is designed to provide students an overview of the PROs research field. The course would focus on specific measurement techniques for assessing outcomes in clinical and health services research studies. The course will not only provide students with an in-depth familiarity with existing measurement instruments but would also include a thorough review of how to develop, analyze, and interpret data from PROs questionnaires. The

course will discuss how PRO instruments are useful to quantify and evaluate outcomes such as overall well-being, quality of life, and patient satisfaction in pediatric, geriatric, and other distinctive populations. *3 semester hours, 3 credits.*

PAS 280 Introduction to Epidemiology

This course will provide students with a fundamental understanding of the general principles of epidemiological methods and their application to public health practice. It will introduce key epidemiological concepts such as association, bias and confounding, as well as the main epidemiological study designs. Precepts will provide opportunities for practical application of skills in interpreting, displaying and communicating epidemiological data. *3 semester hours, 3 credits.*

PAS 281 Economic Evaluation of Health Programs

The course is designed to provide a comprehensive review of economic analysis and health status assessment in the appraisal of health outcomes and program effectiveness in health service research. Major economic evaluation methods such as: cost effectiveness analysis, cost benefit analysis and cost utility analysis are introduced in the context of current health care service system. Application of economic tools and quality of life evaluation instruments in clinical investigations, health services research, and policy analysis will be discussed. *3 semester hours, 3 credits.*

PAS 282 Health Care System and Health Policy

This course will provide an overview of those factors affecting the access disparity, efficiency and quality of the U.S. health care system. These factors include: demographic changes, demand for services, cost shifting, use of health technology, health care workforce distribution, financing of services by payers, Medicare and Medicaid, the evolution of managed care market, and health care reform initiatives. Students will gain an appreciation of the dilemmas confronting policy makers, providers, and the public, and how to balance the conflicting priorities in the current health care system. *3 semester hours, 3 credits.*

PAS 283 Health Care Finance and Reimbursement

This course is designed to provide principles and concepts related to financial, accounting and reimbursement methods practiced by different stakeholders in the US health care system. Students will learn about the financial tools needed by healthcare managers to make better financial, operational and strategic decisions. The impact of reimbursement strategies and payment policies on service delivery and financial performance of healthcare organizations will also be explored. By the end of the course, students should be able to interpret key financial statements, analyze short- and long-term health care

finance data, assess financial benefits and risks incurred by health systems and articulate reimbursement and payment approaches in healthcare. *3 semester hours, 3 credits.*

PAS 285 Essentials of Healthcare Market

This course covers topics including the modern pharmaceutical industry; the nature of pharmaceutical products; ad factors affecting marketing of pharmaceutical products. The U.S. pharmaceutical market is the focus for studying the above aspects. Lecture. *3 semester hours, 3 credits.*

PAS 286 Research Methods in Health Science

Prerequisite: PAS 252 or equivalent. This required course allows the student to understand the fundamental nature of the scientific approach to conducting research. Lecture. *3 semester hours, 3 credits.*

PAS 287 Operations of Healthcare Organization and Patient Safety

This course will provide students with knowledge and decision-making skills to successfully manage operations of healthcare organizations while considering quality of care and patient safety in a demanding healthcare environment. Students will learn to apply principles of design, implement and control transformation process in an efficient and effective way, taking into account policies, regulations, and accreditation standards of healthcare organizations. Topics such as reducing patient wait times, measuring productivity, integrating health information technology, streamlining process flows, managing cost of supply and demand, tracking outcomes and performance metrics will be discussed. Furthermore, students will be introduced to the science of quality, and how it relates to patient safety, patient experience and patient satisfaction. After taking this course, students should be able to apply the knowledge and skills learned to ensure that a healthcare organization meets established standards of responsibility to ensure patient safety and satisfaction. *3 semester hours, 3 credits.*

PAS 288 Strategic and Quality Management of Health Care Industry

This course is designed to provide the principles, methods and concepts related to strategic planning, implementation, and quality management practiced by the US health care system. Students will learn about the methods for evaluating and analyzing the environment external to the healthcare organization, the interaction of forces inside the organization such as governance and resources and their impact on the organization's strategic direction. Key steps in development, execution, management and evaluation of a strategic plan will be discussed. Concepts of quality management (including patient safety, risk assessment and prevention, and patient experience and satisfaction) and

its interrelationship to strategic planning will also be studied. Successful completion of the course will enable the student to formulate, develop and lead the execution of a strategy, and critically evaluate its impact on quality management and performance improvement of the organization. *3 semester hours. 3 credits.*

PAS 290 Managed Health Care and Health Insurance

This course presents an overview of design, regulation, and evaluation of health insurance and managed care plans. The course covers managed care programs, structures, practice models, role of physicians and other clinicians, capitation cost-accounting, and forms of reimbursement. It provides a firm foundation pertaining to private and public sector health insurance/benefit plans, both as provided by employers and government agencies such as Medicaid and Medicare. Key topics include population health management techniques, provider payment, organizational integration, quality and accountability, cost-containment, and public policy. This course is relevant for individuals who will be working in public and private (both for-profit and not-for-profit) health insurance plans and organized delivery systems such as HMOs and hospital/physician integrated delivery systems. *3 semester hours 3 credits.*

PAS 291 Ambulatory Care Practice Management

This course is designed to provide principles and concepts related to the management of an ambulatory care practice. Students will learn about evidence-based healthcare practice management, integrated delivery systems, and theories that govern a healthcare practice. Furthermore, students will gain an understanding of the federal and state laws governing public and private insurance fraud and abuse, and its impact on the delivery of services. *3 semester hours. 3 credits.*

PAS 292 Long-term Care, Home Health and Hospice Care

This course will address long-term service, home health, and hospice care delivery programs that are designed to meet the special needs of aging populations. It will review care and service systems, including the physiological, psychological, and mental health changes common among seniors. Students will apply a case study approach to become well-versed with a conceptual framework for planning, organizing, and delivering services to the aging population, including the ability to define the major physical, mental and psychosocial changes and health problems that accompany aging and their applicability to program development. They will be able to describe the impact of demographics and the changing nature of family relationships on senior services delivery programs as well as to evaluate various models of service delivery, including their relevance to current social

determinants of health. This course will also take an historical, philosophical and managerial perspective of elderly housing and care across the spectrum. The course will analyze the role of financing and the evolving marketplace and will focus on the role of health care delivery within elderly housing, determinants of quality of and access to care, models of health care, and the critical role of quality assurance and management. *3 semester hours. 3 credits.*

PAS 293 Hospital Administration

This course will provide an overview of organizational structure and operating procedures in US health system, with emphasis given to hospital organizations. History, current trends and future challenges of hospital structure and management processes will be discussed. Emerging trends and issues in organizational structure changes and system integration will be examined. Case study analysis in topics such as hospital mergers acquisitions and joint ventures will be provided to augment readings and lecture materials. Upon completion of the course, a student is expected to understand the governance structure and operating dynamics and analyze emerging trends and issues of a typical modern hospital. *3 semester hours. 3 credits.*

PAS 301 Social and Behavioral Health

This course is designed to introduce the student to social concepts and processes that influence health status and public health interventions. The course will provide an introductory background to the kinds of social and behavioral theories that guide our understanding of health related behavior and explore some of the ways in which these theories and approaches may be used in public health practice. *3 semester hours, 3 credits.*

PAS 302 Health Care Data Analysis and Management

This course is designed to develop effective data management skills in clinical and health care research. The course will provide graduate students with an overview of the SAS software and provide technical skills for data management, data analysis, and producing graphs and reports. Hands-on experiences and assignments with real world data from a wide variety of sources such as health care administrative files and Health Survey databases from National Center for Health Statistics will be offered to enable students to master the skills learned in the course. *3 semester hours, 3 credits.*

PAS 900 Master's Research

Supervised research leading to the preparation and completion of a thesis in partial fulfillment of the master's degree requirements. All master's candidates must register for this course until thesis is completed in order to satisfy research requirements. Although students may register for more than six hours, no more than six credits may be applied towards the degree. *3–6 hours per semester, 3–6 credits. Current fee.*

PAS 925 Maintaining Matriculation–Master's

All master's students who are not registered for any other courses must maintain enrollment in the University by registering for this course. Eligibility for thesis option students is typically limited to students who have satisfied all research and degree requirements but have not completed the written and oral components of the thesis. Thesis option students must have written approval from their advisor, department chairman and permission from the graduate dean to register for this course.

No credit. Current fee.

Department of Pharmaceutical Sciences (PHS)

Vijaya L. Korlipara Ph.D., *Chair and Professor*

Program of Study

The Department of Pharmaceutical Sciences is committed to educating research scientists for academic, governmental and industrial institutions. The program is designed to provide the student with critical learning skills, research expertise and a fundamental knowledge base that enables scientists to remain current with scientific literature, to carry out laboratory investigations and to analyze research findings. Students will acquire the necessary skills in a chosen area of concentration (industrial pharmacy, medicinal chemistry, pharmacology, and toxicology) that are essential to enable them to assume leadership positions in the pharmaceutical and biomedical sciences.

IPP 101 Special Problems in Industrial Pharmacy

Laboratory and/or fieldwork in area of specialization in institutional, hospital, cosmetic or industrial pharmacy. *3 semester hours, 3 credits. Current laboratory fee.*

IPP 231 Principles of Manufacturing Pharmacy

Corequisite IPP 231L. A study of the process and equipment employed in the manufacture of solid pharmaceuticals. Operations on a pilot plant scale are utilized to demonstrate the common types of industrial equipment. *Lecture. 3 semester hours, 3 credits.*

IPP 231L Laboratory for Principles of Manufacturing Pharmacy

Credit: 3 semester hours; 1 credit hour. Current laboratory fee.

IPP 233; Industrial Pharmacy Journal Club

This course is composed of research seminars for graduate students pursuing a M.S./Ph.D. degree in Industrial Pharmacy in which

discussion will focus on interpretation, analysis and critical evaluation of research data in published research articles and unpublished research data generated by the graduate students during their dissertation research. *2 semester hours, 2 credits.*

IPP 234 Pharmaceutical Materials

A critical study of the chemical, physical and pharmaceutical properties of raw materials, excipients and inert ingredients that are used in the formulation of cosmetic and pharmaceutical products. *3 semester hours, 3 credits.*

IPP 235 Product Formulation

Corequisite IPP 235L. A study of the formulation and stability testing of dosage forms. *Lecture. 3 semester hours, 3 credits.*

IPP 235L Laboratory for Product Formulation

Corequisite IPP 235. Laboratory. *3 semester hours, 1 credit.*
Current laboratory fee.

IPP 236 Evaluation of Pharmaceutical Dosage Forms

Physical and physicochemical procedures used to evaluate pharmaceutical dosage forms are discussed. Factors affecting drug release from pharmaceutical products are covered along with *in vitro* and *in vivo* procedures for assessing drug absorption efficiency. *Lecture. 3 semester hours, 3 credits.*

IPP 237 Industrial Pharmacy

The basics of pharmaceutical processing and unit operations including both theory and practice of all the major operations underlying pharmaceutical production. *Lecture. 3 semester hours, 3 credits.*

IPP 241 Advanced Biopharmaceutics

A course designed to study the physicochemical, formulation and biological factors which affect the processes of drug absorption, distribution, metabolism and excretion, to learn the advanced pharmacokinetic calculation, analysis, modeling and the use of computer soft wares, and to optimize drug delivery systems for various routes of administration based on biopharmaceutical, pharmacokinetic and clinical considerations. *Lecture. 3 semester hours, 3 credits.*

IPP 247 Special Drug Delivery Systems

Considerations involved in the development and formulation of sustained and controlled release drug delivery systems are discussed. *Lecture. 3 semester hours, 3 credits.*

IPP 250 Targeted Drug Delivery Systems

This elective is designed to focus on different concepts and strategies involved in the design and development of targeted drug delivery systems to different organs and/or sites. *3 semester hours, 3 credits.*

IPP 255 Biotechnological Drug Delivery Systems

This course is designed to focus on various physicochemical, biological and pharmaceutical concepts and strategies involved in the design and development of invasive (parenteral) and noninvasive drug delivery systems for biotechnological drug molecules such as proteins and peptides. *Lecture. 3 semester hours, 3 credits.*

IPP 265 Introduction to Industrial Pharmacy I

This course is designed to provide students opportunities to learn fundamentals of physical, chemical and biological principles used in the preparation, preservation, evaluation and utilization of drug products and/or pharmaceutical dosage forms that are required to comprehend the advanced level material taught in various courses in the industrial pharmacy curriculum. *3 semester hours, 3 credits.*

IPP 266 Introduction to Industrial Pharmacy II

This course further develops the student's opportunities to learn fundamentals of physical, chemical and biological principles used in the preparation, preservation, evaluation and utilization of drug products and/or pharmaceutical dosage forms that are required to comprehend the advanced level material taught in various courses in the industrial pharmacy curriculum. *3 semester hours, 3 credits.*

IPP 267 Advanced Physical Pharmacy

This course is designed to instill in the student an awareness of the various principles of advanced physical pharmacy and pharmaceutical sciences involved in the development of pharmaceutical products. The course includes discussion of colligative properties of solutions, complexation underlying formulation of solutions, rheological properties of pharmaceutical systems, principles for the preparation of coarse dispersions and technology for the preparation of suspensions, microparticles, and nanoparticles. *3 semester hours, 3 credits.*

IPP 271 Degradation and Stability of Pharmaceutical Systems

This course involves study of physical and chemical factors affecting stability of drugs in pharmaceutical dosage forms and approaches to enhance their stability and shelf-life. *Credit: 3 semester hours.*

IPP 273 Pharmacokinetic and Pharmacodynamic Data Analysis

Recommended: IPP 241 or equivalent.

This course is designed to develop a basic understanding of the pharmacokinetic and pharmacodynamics concepts and their model applications governing the time course of drug absorption, distribution and elimination as well as drug action. *3 semester hours, 3 credits.*

MCM 101 Special Problems

Laboratory and/or fieldwork in Medicinal Chemistry. *3 semester hours, 3 credits.*

MCM 207 Peptides and Peptidomimetics

This advanced graduate course instructs the students about the therapeutic potential of peptide natural products, and peptidomimetics. Chemical methods to synthesize peptides and peptidomimetics will be discussed. This course will provide the students with the working knowledge about the structure and function of peptide-based drugs, and the chemical tools available to access these drug leads in both academia and pharmaceutical settings. *3 semester hours, 3 credits.*

MCM 223 Design of Nucleoside Analogs

The chemistry of nucleic acids, nucleotides, nucleosides, purine and pyrimidines is discussed with respect to their structures, syntheses and properties. *3 semester hours, 3 credits.*

MCM 225 Biocatalysis in Drug Discovery

This advanced course focuses on the emerging application of biocatalysis/enzyme catalysis in pharmaceutical discovery. The course will introduce chemical reactions catalyzed by enzymes and their relevant application in the development of natural, and unnatural medicinal molecules, as well as in the development of pharmaceuticals. *3 semester hours, 3 credits.*

MCM 231 Medicinal Chemistry Journal Club

Seminar for graduate students in pharmaceutical sciences in which discussions focus on published experimental results with a view toward evaluation of methodology and a presentation of data. Participation by graduate faculty and students. *2 semester hours, 2 credits.*

MCM 245 Laboratory Use of Radiotracers

A course designed to present the fundamentals of the use of radiotracers in the modern laboratory. Emphasis is placed on safety, experimental design and the variety of special techniques in use today in pharmaceutical research. *3 semester hours, 3 credits.*

MCM 248 Receptors and Mechanism of Drug Action

Discussion is focused on the concept and theories of receptors as an explanation for drug action and design of new therapeutic agents. Special emphasis is placed on the mechanism of action and drug interaction with important categories of drugs. *3 semester hours, 3 credits.*

MCM 255 Chemical Aspects of Drug Metabolism

A detailed discussion of drug metabolizing enzyme systems and reactions. The relationship between chemical structure and drug metabolism is particularly emphasized. Drug metabolism related toxicity is also considered. *3 semester hours, 3 credits.*

MCM 263 Laboratory in Analysis of Biomacromolecules

A course designed to present the fundamentals of the use of modern analytical techniques for the identification and isolation of biomacromolecules. Emphasis is placed on protein purification methods. *3 semester hours, 3 credits.*

MCM 265 Principles of Drug Design I

This course is the first half of the Principles of Drug Design sequence designed to present to the student, an overview of the basic principles involved in Medicinal Chemistry. This will include discussion on drug-receptor interactions, quantitative structure activity relationship (QSAR) studies, molecular modeling, and the application of recombinant DNA technology in medicinal chemistry and drug discovery. Examples of drugs obtained through rational drug design and random screening methods will be presented. *3 semester hours, 3 credits.*

MCM 266 Principles of Drug Design II

This course is second half of the Principles of Drug Design sequence designed to present to the student, an overview of the basic principles involved in Medicinal Chemistry. This will include discussion on drug metabolism, peptidomimetics in drug design, design and application of prodrugs, and design of enzyme inhibitors. *3 semester hours, 3 credits.*

MCM 267 Computer-Aided Drug Design

This course is designed to provide students with the background and a hands-on understanding of techniques involved in computer-aided drug design, including molecular mechanics/dynamics, quantum mechanics, protein sequence alignments, homology modeling, protein binding site identification and analysis, small molecule conformation generation/clustering, property generation/filtering, virtual screening, ADME/Toxicity predictions, quantitative structure-activity relationship (QSAR), cheminformatics, ligand docking, and pharmacophore mapping in drug development. The first half of the semester will be mainly lectures to provide necessary background for doing subsequent hands-on modeling experiments. *3 semester hours, 3 credits.*

MCM 268 Drug Synthesis

This course will present synthesis of current and new drugs. Chemical methods of synthesis will be introduced. Both heterocyclic and carbocyclic methods will be covered. This course will provide the students with a working knowledge of the principles of chemical syntheses as they apply to specific drugs. *3 semester hours, 3 credits.*

MCM 269 Advanced Topics in Prodrug Design

This course is designed to provide the students with selected advanced topics of prodrugs and the principles involved in prodrug design. This

will also include discussion on objectives and strategic consideration of prodrug design and characterization. *3 semester hours, 3 credits.*

MCM 270 Medicinal Chemistry of Antiviral and Anticancer Chemotherapeutic Agents

This course is designed to instruct the students on the design, discovery, structure activity relationships and chemical mechanisms of actions of antiviral and anticancer chemotherapeutic agents. Case studies in the discovery and development of novel antiviral and anticancer agents will be presented and will include strategies for enzyme inhibition and metabolic blockade. *3 semester hours, 3 credits.*

MCM 275 Chemical Glycobiology

The biological function of carbohydrates extends far beyond their classical roles as an energy source and structural building blocks. Homeostasis, inflammation, fecundation, tumor metastasis, muscular integrity, and infection are a few examples of biological phenomena that involve the molecular recognition of glycans as part of the associated biochemical processes. This course will immerse the students into the multidisciplinary field of the glycosciences and will cover from basic topics related to the structure, function, and synthesis of saccharides; to advanced applications such as the development of glycomimetic drug candidates and the design of carbohydrate-based immunotherapies. *3 semester hours, 3 credits.*

PHM 101 Special Problems

Conferences on specialized topics accompanied by laboratory work in pharmacology. *3 semester hours, 3 credits.*
Current laboratory fee.

PHM 102; 103 Principles of Pharmacology I; II

Introduction to the science of pharmacology with emphasis on the basic principles. There is in-depth consideration of the factors modifying drug responses and dose-response relationships. *3 semester hours, 3 credits for each.*

PHM 201 Pharmacology of the Autonomic Nervous System

An overview of the established pharmacology of the autonomic nervous system is presented as well as a comparison with the pharmacology of the somatic nervous system. *3 semester hours, 3 credits.*

PHM 202 Advanced Pharmacology

This course intends to introduce the student to select *in vivo* and *in vitro* techniques used in the quantitative evaluation of pharmacological principles, molecular aspects of pharmacological research and receptor binding/signal transduction. *Credit: 3 semester hours.*

PHM 203 Research Methods in Pharmacology

This course intends to introduce the student to select *in vivo* and *in vitro* techniques used in quantitative evaluation of pharmacological agents. *3 semester hours, 3 credits.*
Current laboratory fee.

PHM 209 Pharmacological Aspects of Respiratory Disease

Pulmonary physiology will be reviewed; anatomy and the process of respiration, gas exchange, control of respiration and acid balance will be included. The anatomical, physiological and biochemical basis of respiratory disease (or pathology) will be discussed. *3 semester hours, 3 credits.*

PHM 211 Biochemical Neuropharmacology

The biochemical bases of the action of drugs in the nervous system are discussed. The molecular and biochemical pharmacology of acute and chronic effects of neuropharmacologic agents are reviewed and new techniques and findings in biochemical neuropharmacology are considered. *3 semester hours, 3 credits.*

PHM 216 Advanced Psychopharmacology

This course provides an introduction to the neuro-pharmacological bases of behavior and drugs used to treat behavior disorders. The role that specific neurochemical systems play in regulating behavior is considered and discussed. The molecular, biochemical and behavioral mechanism of action of many psychotropic drugs is covered. *3 semester hours, 3 credits.*

PHM 221 Clinical Pharmacology

Discussion and demonstration of the clinical basis for the therapeutic application of drugs. Toxicity and adverse reactions are considered. Case material from actual patient populations is used to illustrate and support this information. *3 semester hours, 3 credits.*

PHM 232 Pharmacology Journal Club

Seminar for graduate students in pharmaceutical sciences in which discussions focus on published experimental results with a view toward evaluation of methodology and a presentation of data. Participation by graduate faculty and students. *3 semester hours, 3 credits.*

PHM 240 Pharmacology of Anticancer Drugs

This course is designed to instruct students in the area of Pharmacology of anticancer drugs. This course covers the following aspects of anticancer drugs: mechanisms of action; critical pharmacokinetic parameters and drug-drug interactions; adverse reactions and toxicity. *3 semester hours, 3 credits.*

PHM 246 Pharmacology of Drug Abuse

A study of the various chemical agents of dependence with in-depth consideration of the mechanisms and nature of the chemical agents involved in this phenomenon. *Credit: 3 semester hours.*

PHM 247 Reproductive Pharmacology

A consideration of the effect of drugs on the reproductive system during the periods of development, maturation and aging.
3 semester hours, 3 credits.

PHM 249 Cardiovascular Pharmacology

The course considers the mechanism of action of myocardial stimulants and depressants as well as anti-arrhythmic drugs. *3 semester hours, 3 credits.*

PHS 212; 213 Applied Biochemistry I; II

A course dealing with those aspects of biochemistry of special relevance to students of the health sciences. Emphasis is placed on fundamental metabolic cycles and processes and on biochemical concepts needed to understand drug action and metabolism, biogenetic pathways and various disease states. *3 semester hours, 3 credits each.*

PHS 239 Functional Neuroanatomy and Neuropathology

This course instructs the student in the anatomy and physiology of the central and peripheral nervous systems and describes the processes by which these systems undergo pathological change. *3 semester hours, 3 credits.*

PHS 240 Principles of Electron Microscopy

Corequisite: PHS 240L. This course is intended to instruct the student in the basic techniques of electron microscopy. It also describes the analytical methods used to identify various biological systems. *3 semester hours, 3 credits.*

PHS 240L Electron Microscopy Laboratory

Corequisite: PHS 240. This course instructs the student in the preparation of tissue for electron microscopy and the interpretation and analysis of electron micrographs. *3 semester hours; 1 credit hour. Current laboratory fee.*

PHS 250 Cell and Tissue Culture

Student is acquainted with cell culture technology as well as biochemical and biophysical characteristics and capabilities of mammalian cells in culture. *3 semester hours, 3 credits.*

PHS 250L Cell and Tissue Culture Laboratory

Corequisite: PHS 250. This course is the laboratory component of PHS 250. Hands-on laboratory experiments in cell culture technology are performed by the students. The objective of the laboratory assignments is to expose the student to the biological, biophysical, and toxicological characteristics of mammalian cells in culture. *3 semester hours, 1 credit. Current laboratory fee.*

PHS 251 Doctoral Seminar in the Pharmaceutical Sciences I

A monthly seminar for all students pursuing the Ph.D. The seminar consists of scheduled presentations given by scholars in the pharmaceutical sciences. *8 hours per semester. No credit.*

PHS 252 Doctoral Seminar in the Pharmaceutical Sciences II

A monthly seminar for all students pursuing the Ph.D. The seminar consists of scheduled presentations given by scholars in the pharmaceutical sciences. *8 hours per semester. No credit.*

PHS 253 Doctoral Seminar in the Pharmaceutical Sciences III

A monthly seminar for all students pursuing the Ph.D. The seminar consists of scheduled presentations given by scholars in the pharmaceutical sciences. *8 hours per semester. No credit.*

PHS 254 Doctoral Seminar in the Pharmaceutical Sciences IV

A monthly seminar for all students pursuing the Ph.D. The seminar consists of scheduled presentations given by scholars in the pharmaceutical sciences. *8 hours per semester. 1 credit.*

PHS 256 Pharmaceutical Analysis Laboratory

A detailed discussion of the basic principles of pharmaceutical analysis. Special emphasis is placed on the selection and development of qualitative and quantitative methodology for the analysis of drug molecules in a variety of sample environments. *3 semester hours, 3 credits.*

PHS 257 Gene Technology in the Pharmaceutical and Health Sciences

Course presents the basic mechanism underlying the expression of the information encoded in the DNA: transcription, translation and replication. *3 semester hours, 3 credits.*

PHS 259 Cell Signals and Regulatory Systems

A course covering the elements of regulation at the level of the cell. The intracellular events of signaling, i.e., post-receptor events, are the focus. *3 semester hours, 3 credits.*

PHS 260 Clinical Immunology

A detailed discussion of the basic concepts of immunology, immunity and immuno-pathology. Special emphasis is placed on the aspects of clinical immunology with reference to the theory which underlies laboratory tests and methods of procedure. *3 semester hours, 3 credits.*

PHS 261 Laboratory in Gene Technology for the Pharmaceutical and Allied Health Professions

Corequisite PHS 257. The use of modern databases to mine known information and synthesize new conclusions from combined resources is used as a starting point. The class is divided into groups, each working with a different protein or a mutant of the target protein. *3 semester hours, 1 credit. Current laboratory fee.*

PHS 264 Analysis of Cell Structure and Function

Corequisite PHS 264L. A study of cell structure and function including discussions of membrane transport, respiration, cell division and cell motility. Additional topics include enzyme function. DNA, RNA and protein synthesis and their control. Discussion of methods of cell study will be incorporated in specific lecture topics, i.e., membranes, and in laboratory sessions. *3 semester hours, 3 credits.*

PHS 264L Analysis of Cell Structure and Function Laboratory

Co-requisite: PHS 263. Laboratory component of PHS 264. *3 semester hours. Credit: 1 credit hour. Current laboratory fee.*

PHS 270 Introduction to Biotechnology

This course discusses the basic mechanisms underlying the expression of information encoded in the DNA, i.e., transcription, translation and replication. *3 semester hours, 3 credits.*

PHS 271 Oxidants, Antioxidants and Free Radicals

This course focuses on the involvement of free radicals/reactive oxygen species (ROS) in the pathogenesis of a wide variety of human diseases. *3 semester hours, 3 credits.*

PHS 278 Human Physiology

An examination of the principles of human physiology, starting with cellular physiology principles such as membrane transporters and action potentials, and covering several of the key topics of physiology: endocrine, neural, muscle, cardiovascular, respiratory, gastrointestinal, and renal. *3 semester hours, 3 credits.*

PHS 280 Regulation of Intermediary Metabolism

The basis for understanding how pathways of intermediary metabolism relate to energy and to one another is presented. Methods for identification of control points, means of control of pathway flow, and how homeostasis is achieved from a biochemical viewpoint are presented. The classical basis of metabolism and current advances are presented. *3 semester hours, 3 credits.*

PHS 900 Master's Research

Supervised research leading to the preparation and completion of a thesis in partial fulfillment of the master's degree requirements. All master's candidates must register for this course until research is completed in order to satisfy research requirements. Although students may register for more than six hours, no more than six credits may be applied toward the degree. *Credit: 3–6 hours per semester. Current laboratory fee.*

PHS 910 Advanced Master's Research

The student will conduct research in their field of study. Results will be presented in the form

of a written dissertation. Students may register for this course to a maximum of 2 semesters. *Credit: 1 credit.*

PHS 925 Maintaining Matriculation–Master's

All master's students who are not registered for any other courses must maintain enrollment in the University by registering for this course. Eligibility for thesis option students is limited to students who have satisfied all research and degree requirements but have not completed the written and oral components of the thesis. Thesis option students must have written approval from their advisor, department chairman and permission from the graduate dean to register for this course. *No credit. Current fee.*

PHS 930 Internship in Pharmaceutical Sciences

This course will provide practical knowledge to the student in a field of pharmaceutical sciences through internship in an industrial or non-academic research environment. The internship can be in any aspect of Pharmaceutical Sciences (industrial pharmacy, medicinal chemistry, pharmacology, and toxicology) and will consist of an equivalent of full-time experience for a minimum of 15 weeks during the Spring, Summer, or Fall semesters and may be extended for up to one year. The program of internship study will be developed by the internship mentor and approved by the PHS department. The program of internship study will provide practical application of didactic material associated with the field of pharmaceutical sciences.

PHS 940 Maintaining Matriculation–Ph.D.

Ph.D. students must maintain matriculation if they are not registered for courses or have not yet passed their comprehensives. *Limit: 2 semesters. No credit. Current fee.*

PHS 950 Doctoral Research

Original research leading to the doctoral degree. Doctoral students may register for 950 while completing degree requirements; however, upon the successful completion of formal courses, language requirement and comprehensive examination, doctoral candidates must register for PHS 950 until the dissertation is completed and the degree is awarded. *3 semester hours, 3 credits. Current laboratory fee.*

PHS 960 Advanced Doctoral Research

Original research, leading to the doctoral degree. Doctoral students may register for PHS 960 upon the successful completion of formal courses, language requirement and comprehensive examination, and 15 credits of doctoral research PHS 950. Students may register for this course to a maximum of 2 semesters. *Credit: 1 credit.*

TOX 101 Special Problems

Conferences on specialized topics accompanied by laboratory work in toxicology. *3 semester hours, 3 credits. Current laboratory fee.*

TOX 102; 103 Toxicology I; II

An introduction to toxicology with emphasis on mechanisms of toxicity and responses of biological systems to chemicals. The source, chemical composition, action, tests and antidotes of toxic substances will be considered. First semester will cover the fundamentals of toxicokinetics and start target system toxicity. Second semester will continue target organ toxicity and provide an overview of agents and environmental, forensic/analytical, and regulatory toxicology. *3 semester hours, 3 credits for each.*

TOX 201 Methods in Toxicologic Evaluation

This course focuses on a variety of experimental methods utilized to determine the safety and toxicity of materials administered by mouth, applied topically to the skin or mucous membranes, or administered by inhalation of gasses or aerosols. *3 semester hours, 3 credits.*

TOX 205 Neurotoxicology

This course examines the various classes of neurotoxins, their mechanism of toxicity and experimental models used to assess neurotoxic mechanisms. *3 semester hours, 3 credits.*

TOX 207 Recent Advances in Forensic Toxicology

A survey emphasizing recent developments in the field of forensic toxicology. Emphasis is placed on documentation and interpretation of analytical results. *3 semester hours, 3 credits.*

TOX 209 Recent Advances in Clinical Toxicology

A survey of current literature, emphasizing recent advances in clinical toxicology. *3 semester hours, 3 credits.*

TOX 210 Biochemical Toxicology

An advanced study of the biochemical principles and mechanisms underlying the toxicity of xenobiotics at the cellular level. Biotransformation pathways and the subcellular toxicity of selected toxicants are examined in depth. *3 semester hours, 3 credits.*

TOX 215 Analytical Methods in Toxicology

This course considers methods of specimen and sample preparations and extraction and analytical chemical techniques used to solve problems confronting the analytical toxicologist. *3 semester hours, 3 credits.*

TOX 216 Environmental and Occupational Toxicology

The chemical and regulatory aspects of environmental and occupational hazards are presented, with an overview of methods in epidemiology and risk assessment. *Credit: 3 semester hours.*

TOX 217 Toxicology of the Hematopoietic and Immune System

This course focuses upon the effects of toxic substances on hematologic and immunologic function. *3 semester hours, 3 credits.*

TOX 218 Pathophysiology of Organ Systems (CPP 304)

This course is designed to explain the abnormal physiological processes which result when normal metabolic functions are disturbed. Mechanisms of normal function are described as well as the resulting effect of altered homeostasis. *3 semester hours, 3 credits.*

TOX 219 Molecular Toxicology

This course is an advanced study of the specific molecular, biochemical and cellular mechanisms of toxic injury. *3 semester hours, 3 credits.*

TOX 222 Cellular Pathophysiology

This course is designed to explain the cellular response to injury. Molecular, biochemical and organelle pathology is discussed in relation to normal cell function. *3 semester hours, 3 credits.*

TOX 223 Liver and Kidney Toxicology

This toxicology course will cover the principles and mechanisms underlying the responses of the liver and kidneys to environmental and pharmaceutical agents at the molecular, cellular, and organ levels. Biotransformation pathways, signaling pathways, and the subcellular toxicities of selected liver and kidney toxicants will be examined in depth. Lectures will emphasize current concepts and applied methodologies related to liver and kidney toxicology and safety assessment. *3 semester hours, 3 credits.*

TOX 230 Toxicology Journal Club

Seminar for graduate students in pharmaceutical sciences in which discussions focus on published experimental results with a view toward evaluation of methodology and a presentation of data. Participation by graduate faculty and students. *2 semester hours, 2 credits.*

TOX 250 Product Safety and Risk Management

This course is designed to provide toxicology graduate students with practical knowledge of applied product safety and risk assessment in the pharmaceutical and consumer products industry. *3 semester hours, 3 credits.*

TOX 285 Environmental Health Sciences

Environmental health sciences represents the study of environmental factors including biological, physical and chemical factors that affect the health of a community. The casual links between chemical, physical, and biological agents in the environment and their impact on human health will be discussed. *3 semester hours, 3 credits.*

TOX 900 Master's Research

Supervised research leading to the preparation and completion of a thesis in partial fulfillment of the master's degree requirements. All master's candidates must register for this course until research is completed in order to satisfy research requirements. Although students may register for more than six hours, no more than six credits may be applied towards the degree. *Credits: 3–6 semester hours. Current laboratory fee.*

TOX 925 Maintaining Matriculation

All master's students who are not registered for any other courses must maintain enrollment in the University by registering for this course. Eligibility for thesis-option students is limited to students who have satisfied all research and degree requirements but have not completed the written and oral components of the thesis. Thesis-option students must have written approval from their advisor, department chairman and permission from the graduate dean to register for this course. *Current fee.*

For complete listing of approved courses, please contact your Dean's office.

Department of Clinical Health Professions

Ebtasam Ahmed, *Clinical Professor*; Pharm.D., St. John's University.

Corinne I. Alois, *Assistant Professor Industry Professional*, B.S., St. John's University; M.S., Pace University.

Emily M. Ambizas, *Associate Clinical Professor*, B.S. Phm., Pharm.D., St. John's University.

Vibhuti Arya, *Associate Clinical Professor*, Pharm.D., St. John's University.

Carmela Avena-Woods, *Associate Clinical Professor*, B.S. Phm., Pharm.D., St. John's University.

Judith L. Beizer, *Clinical Professor*, B.S. Phm., St. Louis College of Pharmacy; Pharm.D., University of Tennessee.

Sandra Beysolow, *Associate Professor Industry Professional*, B.S., Long Island University; M.S. Ph.D., Capella University.

Jennifer Bhuiyan-Qadeer, *Assistant Professor Industry Professional*, Pharm.D., St. John's University.

Nicole Bradley, *Assistant Clinical Professor*, Pharm.D., Massachusetts College of Pharmacy and Health Sciences.

Joseph M. Brocovich, *Associate Clinical Professor*, B.S. Phm., Philadelphia College of Pharmacy and Science; Pharm.D., Duquesne University.

Tina Caliendo, *Assistant Professor Industry Professional*, B.S. Phm., St. John's University, Pharm.D. University of Florida.

Manouchkath Cassagnol, *Associate Clinical Professor*, Pharm.D., Florida Agricultural and Mechanical University.

Christine Chim, *Assistant Professor Industry Professional*, Pharm.D. St. John's University.

Jennifer Chiu, *Associate Professor Industry Professional*, B.S., Binghamton; M.B.A., St. Joseph's College; Ed.D., Dowling College.

Robina Colclough-Davy, *Clinical Instructor Industry Professional*, B.S., York College; M.S., Long Island University.

John M. Conry, *Clinical Professor*, B.S. Phm., Pharm.D., St. John's University.

Angela Eaton, *Assistant Professor Industry Professional*, B.S., M. Ed. Wayland Baptist University.

Gladys M. El-Chaar, *Clinical Professor*, B.A., East Stroudsburg University; B.S. Phm., St. John's University; Pharm.D., Medical University of South Carolina.

Joseph V. Etzel, *Associate Clinical Professor*, B.S. Phm., Pharm.D., St. John's University.

Danielle C. Ezzo, *Associate Clinical Professor*, B.S. Phm., Pharm.D., St. John's University.

Laura M. Gianni, *Associate Clinical Professor*, B.S. Phm., Pharm.D., St. John's University.

Regina Ginzburg, *Associate Clinical Professor*, B.S. Phm., Pharm.D., St. John's University.

Pamela Gregory-Fernandez, *Associate Professor Industry Professional*, B.S., St. John's University, M.S., A.T. Still University.

Olga Hilas, *Associate Professor Industry Professional*, B.S. Phm., Pharm.D., St. John's University.

Lisa Hochstein, *Associate Professor Industry Professional*, B.S., Richmond College; M.S., St. John's University.

Mary Ann Howland, *Clinical Professor*, B.S., Wake Forest University; B.S. Phm., Rutgers University; Pharm.D., Philadelphia College of Pharmacy and Science.

Gregory J. Hughes, *Associate Clinical Professor*, Pharm.D., St. John's University.

Elsen Jacob, *Assistant Professor Industry Professional*, Pharm.D., St. John's University.

Samantha Jellinek-Cohen, *Associate Clinical Professor*, Pharm.D., Long Island University.

Tina Kanmaz, *Associate Clinical Professor*, B.A., Hofstra University, B.S. Phm., Pharm.D., St. John's University.

Farah Khorassani, *Assistant Clinical Professor*, B.A., University at Buffalo, State University of NY; Pharm. D, Massachusetts College of Pharmacy and Health Sciences.

Danielle Kruger, *Associate Professor Industry Professional*, B.S., St. Francis College; M.S.Ed., Capella University.

Sum Lam, *Associate Clinical Professor*, B.S. Phm., Pharm.D., University of Connecticut.

Chung-Shien Lee, *Assistant Professor Industry Professional*, Pharm. D, St. John's University.

Louise Lee, *Associate Professor Industry Professional*, B.S., Stony Brook, M.H.A. St. Joseph's College., Ed.D., Northcentral University.

Yuman Lee, *Associate Clinical Professor*, Pharm.D., St. John's University.

Celia Lu, *Assistant Professor Industry Professional*, Pharm.D, St. John's University.

William M. Maidhof, *Associate Professor Industry Professional*, B.S. Phm., Pharm.D., St. John's University.

Nicole M. Maisch, *Associate Clinical Professor*, B.S. Phm., Pharm.D., Albany College of Pharmacy.

Maria Mantione, *Associate Clinical Professor*, B.S. Phm., Pharm.D., St. John's University.

Nissa Mazzola, *Associate Clinical Professor*, Pharm.D., St. John's University.

Teresa Miller, *Associate Professor Industry Professional*, B.S., SUNY Downstate; M.S., St. John's University; Ph.D., Temple University.

Zaidalynet Morales, *Associate Professor Industry Professional*, B.S. Lehman College M.S., St. Joseph's College.

Samantha Moore, *Assistant Professor Industry Professional*, Pharm.D., Massachusetts College of Pharmacy and Health Sciences.

Kimberly Ng, *Assistant Professor Industry Professional*, Pharm.D. St. John's University.

Khusbu Patel, *Assistant Professor Industry Professional*, Pharm.D. St. John's University.

Mary Jo Perry, *Associate Professor Industry Professional*, A.S., Northeastern University; B.S., Adelphi University; M.S., Long Island University, C.W. Post College.

Michele Pisano, *Associate Professor Industry Professional*, Pharm.D. St. John's University.

Daniel Podd, *Associate Professor Industry Professional*, B.S., St. John's University; M.S., University of Nebraska Medical Center.

Alyssa Quinlan, *Assistant Professor Industry Professional*, B.S. Marist College, M.S. Pace University.

Josh Rickard, *Assistant Professor Industry Professional*, Pharm.D., South Carolina College of Pharmacy.

Maha Saad, *Associate Clinical Professor*, B.S., Rosary School Mansourieh, Lebanon; B.S., Phm., Pharm.D., Lebanese American University.

Sharon See, *Clinical Professor*, B.S. Phm., Pharm.D., Rutgers University.

Hira Shafeeq, *Associate Professor Industry Professional*, Pharm.D., St. John's University.

Stacey Singer-Leshinsky, *Associate Professor Industry Professional*; B.S., Brooklyn College, M.S. Ed., Capella University.

Sarah Smith, *Associate Professor Industry Professional*, Pharm.D., University of Kentucky.

Damary Torres, *Associate Clinical Professor*, B.S., Phm., Pharm.D., St. John's University.

Department of Pharmacy Administration and Public Health

Afolarin Aiyedun, *Assistant Professor Industry Professional*, B.S., SUNY Stony Brook; M.S. and Ed.D., Columbia University.

Preety Gadhoke, *Assistant Professor Industry Professional*, B.A. Knox College, M.P.H. Rollins School of Public Health, Emory University, Ph.D. Johns Hopkins Bloomberg School of Public Health, International Health. Public Health.

Yolene Gousse, *Assistant Professor Industry Professional*, B.A. St. John's University, M.P.H. Hunter College, City University of New York, Dr.P.H. School of Public Health, State University of New York.

Sen Gu, *Associate Professor*, M.A., M.S., Ph.D., University of Maryland; M.D., Tongji Medical University, China; Pharmaceutical Health Services.

Harlem Gunness, *Associate Professor Industry Professional*, B.S. and M.P.H., Hunter College; Ph.D., Rutgers University.

Monica Hwang, *Associate Professor*, B.S., Sung Kyun Kwan University, South Korea; M.S., Ph.D., University of Wisconsin; Social and Administrative Sciences in Pharmacy.

Martha L. Mackey, *Associate Professor*, B.A., M.A., J.D., St. John's University; Pharmacy law; pharmacy education.

Robert A. Mangione, *Professor*, B.S. Phm., M.S., P.D., Ed.D., St. John's University; Pharmacy education; celiac disease; pharmaceutical care for disadvantaged patients.

Jagannath M. Muzumdar, *Associate Professor*, B.S., Mumbai University; M.S., Mississippi State University; M.S., University of Toledo; Ph.D., University of Minnesota; Social and Administrative Pharmacy.

Rajesh Nayak, *Associate Professor*, B.S. Phm., M.S. Phm., Mangalore University; Ph.D., University of Florida; Pharmaceutical outcomes research; evaluation of health care policies and programs; pharmacoeconomics.

Somnath Pal, *Professor*, B.S. Phm., M.S., Jadavpur University; M.B.A., Calcutta University; Ph.D., University of Iowa; Drug utilization studies.

Taehwan Park, *Assistant Professor*, B.S. Pharm. Chung-Ang University, M.S. Seoul National University, Ph.D. University of Minnesota.

Wenchen Wu, *Associate Professor*, B.S., Taipei Medical College; M.B.A., Ph.D., University of Minnesota; Pharmacoeconomics; computer applications in pharmacy; pharmacy management.

Department of Pharmaceutical Sciences

Saurabh Agarwal, *Assistant Professor*, B.S., University of Kanpur, India; M.S., Jiwaji University, Gwalior, India; Ph.D., University of Lucknow, Lucknow, India. Deciphering the biological, genetic, and epigenetic mechanisms in pediatric cancer neuroblastoma. The development of effective targeted therapeutic approaches for cancers, identifying the signaling mechanisms in cancer stem cells, re-purposing the approved drugs, and development of effective tumor models.

Frank A. Barile, *Professor*, B.S. Phm., M.S., St. John's University; Ph.D., In vitro toxicology.

Michael Barletta, *Professor*, B.S. Phm., M.S., St. John's University; Ph.D., New York Medical College; Cardiovascular pharmacology using animal models for myocardial infarction, cardiac arrhythmias, ischemic heart disease and thrombosis.

Andrew J. Bartilucci, *Dean Emeritus and Executive Vice President Emeritus*, B.S., Phm., St. John's University; M.S., Rutgers University; Ph.D., University of Maryland.

Blase C. Billack, *Professor*, B.S., University of Richmond; Ph.D., Rutgers University; In vitro and in vivo models of skin toxicity and protection by small molecules.

Jerome Cantor, *Professor*, B.A., Columbia University; M.D., University of Pennsylvania; Experimental lung pathology.

Joanne M. Carroll, *Associate Professor*, B.S., Molloy College; M.A., CUNY, Hunter College; Ph.D., CUNY; Molecular mechanisms regulating gene expression in neural and endocrine cells.

Joseph M. Cerreta, *Associate Professor*, B.S., M.S., Ph.D., Fordham University; Molecular biology of connective tissue alterations in the lung.

Zhe-Sheng Chen, *Professor*, M.S., Sun Yat-Sen University of Medical Sciences, P.R. China; M.D., Guangdong Medical and Pharmaceutical College, Guangdong Province, China; Ph.D., Institute for Cancer Research, Kagoshima University, Japan; Cancer pharmacology and experimental therapeutics, especially cellular mechanisms of multi-drug resistance and its reversal.

Xingguo Cheng, *Associate Professor*, B.S., M.S., Wuhan University, P.R. China; Ph.D. University of Kansas Medical Center. Mechanistic characterization of actions of therapeutic drugs and environmental chemicals in the liver.

Vikas V. Dukhande, *Assistant Professor*, B.S., Mumbai University Institute of Chemical Technology, India; Ph.D., Idaho State University. Pharmacological and biochemical studies of metabolic diseases such as diabetes and cancer.

Sue M. Ford, *Associate Professor*, B.S., Cornell University; M.S., Ph.D., Michigan State University; Use of cell culture to study responses of kidney to toxicants; nutrition.

Marc Gillespie, *Professor*, B.A., University of Vermont, Ph.D., University of Utah; Toxicology, biomarker discovery, and bioinformatics. Development of novel molecular assays, and biocuration of human molecular processes, the Reactome project.

Vivek Gupta, *Assistant Professor*, B.S. Pharmaceutical Sciences–Jamia Hamdard University, New Delhi, India, Ph.D., Texas Tech University Health Sciences Drug discovery and delivery for respiratory disorders, Novel drug delivery system, Drug repurposing.

Diane Hardej, *Associate Professor*, B.A., Queens College; M.S., Ph.D., St. John's University; Gastrointestinal and neurotoxicity of pesticides and environmental toxicants

Vijaya L. Korlipara, *Professor*, B.S. Phm., Banaras Hindu University; Ph.D., University of Minnesota; Design and synthesis of probes for drug targets associated with pain, cancer, and multi-drug resistance.

Nitesh K. Kunda, *Assistant Professor*, B. Pharm (Hons.), Birla Institute of Technology and Science, Pilani; MSc., The School of Pharmacy, University of London; Ph.D., Liverpool John Moores University; Nanotherapeutics against infectious disease and cancer, targeted drug delivery, and drug and vaccine formulation for pulmonary delivery.

Chul-Hoon Kwon, *Professor*, B.S. Phm., Howard University; Ph.D., University of Minnesota; Design, synthesis and evaluation of pro-drugs, especially in anti-tumor agents and anticonvulsants; chemical aspects of drug metabolism and toxicology.

Cesar A. Lau-Cam, *Professor*, B.S. Phm., University of San Marcos, Peru; M.S., Ph.D., University of Rhode Island; Effect of natural product (amino acids, carbohydrates, vitamins, plant constituents) on the biochemistry, pharmacology and toxicology of ethanol.

Senshang Lin, *Professor*, B.S. Phm., Taipei Medical College; Ph.D., Temple University; pharmacodynamic, transmucosal drug delivery.

Woon-Kai Low, *Associate Professor*, B.S., University of Waterloo; Ph.D., University of Toronto; Study of eukaryotic control mechanisms of protein translation and the cellular impact of deregulation in disease states.

Lin Mantell, *Professor*, M.D., Beijing University; Ph.D., Stony Brook University; Identifying and characterizing molecular and cellular mechanisms underlying the increased lung injury and infection due to oxidative stress during oxygen therapy.

Ashley Thomas Martino, *Associate Professor*, B.A., California State University Northridge; Ph.D., University of Florida. Viral gene therapy, gene editing and immunology.

Aaron Muth, *Assistant Professor*, B.S. SUNY Binghamton; M.A. University of Virginia; Ph.D. University of Central Florida. Discovery of novel inhibitors and subsequent probes of key protein-protein interactions for the treatment and investigation of various cancers.

Raymond S. Ochs, *Professor*, B.S., Purdue University; Ph.D., Indiana University; The control of metabolic pathways by hormones and energy supply; muscle cell culture line and computer modeling.

Ketan Patel, *Assistant Professor*, B.Pharm. Anand Pharmacy College, Anand, India; M.Pharm. Bombay College of Pharmacy Mumbai University, Ph.D. Institute of Chemical Technology, Mumbai, India. Development of tumor targeted nanoparticles of novel class of anticancer molecules and strategies to modulate tumor microenvironment for the treatment of drug resistant melanoma and pancreatic cancer. Abuse deterrent formulation technologies, 3D printed dosage form and pre-exposure prophylaxis for HIV prevention using hot melt extrusion and bilayer film technology.

Jeanette C. Perron, *Assistant Professor*, B.S.; Ph.D., University of Miami. Cellular and molecular mechanisms of BMP signaling in spinal sensory neuron development and other BMP-evoked chemotropic activities.

Sandra E. Reznik, *Professor*, A.B. Harvard University; M.D., Ph.D., Mount Sinai School of Medicine; Molecular mechanisms and novel pharmacotherapeutic approaches to preterm birth and other inflammatory disorders.

Bhagwan D. Rohera, *Professor*, B.S. Phm., M.S., Saugar University; Ph.D., University of Basel, Switzerland; Compaction of powder systems; controlled drug delivery; formulation and process optimization.

Carlos Sanhueza-Chavez, *Assistant Professor*, B.Sc., University of Concepcion, Chile; M.Sc. and Ph.D., University of La Laguna, Spain; Chemical immunology of carbohydrates; targeted drug delivery systems; glycomimetic drugs; carbohydrate-based therapies for neglected and emerging diseases.

Francis A.X. Schanne, *Associate Professor*, B.A., La Salle College; Ph.D., Temple University; Molecular mechanisms of cellular injury and protection.

Abu Serajuddin, *Professor*, B.S. Phm., Dhakra University, Bangladesh; M.S., Columbia University; Ph.D., St. John's University; Industrial pharmacy; Development of novel drug delivery systems, especially for poorly water-soluble drugs, and innovation in processing technologies for solid dosage form.

Jun Shao, *Associate Professor*, B.S. Phm., Zhejiang University, M.S., China Pharmaceutical University, Ph.D., West Virginia University; Biotechnology and drug delivery; traditional Chinese medicine for cancer.

Emilio Squillante, *Associate Professor*, B.S. Phm., M.S., Ph.D., University of Rhode Island; Supercritical fluids; dissolution, pharmacokinetic and bioavailability to studies; drug analysis; transdermal absorption studies.

Tanaji Talele, *Professor*, B.S., University of Pune, India; M.S., Ph.D., Mumbai University, India; Computer-aided design (docking-3D-QSAR) and development of anticancer and antifungal compounds.

Louis Trombetta, *Professor*, B.S., M.S., Ph.D., Fordham University; Metal neurotoxicology and oxidative stress.

John N.D. Wurple, *Associate Professor*, B.S., Belmont Abbey College; M.S., Fairleigh Dickinson University; Ph.D., Pennsylvania State University; Effects of neuropeptides on CNS; neurophysiology of seizures.

Sabesan Yoganathan, *Assistant Professor*, B.Sc. Chemistry: McMaster University, Canada; Ph.D. Organic Chemistry and Chemical Biology: University of Alberta, Canada. Development of anticancer, anti-infective and anti-inflammatory natural products through medicinal chemistry and bioactivity guided investigation.

S. William Zito, *Professor Emeritus*, B.S. Phm., St. John's University; Ph.D., University of Connecticut.

Please visit the following webpage for a complete list of our faculty, including current adjunct faculty.