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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, and pharmacy administration. Thesis and non-thesis options are available in all programs leading to the Master of Science degree except the specialty track in biopharmaceutical technology and regulatory affairs/quality assurance.

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:

Pharmaceutical Sciences

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

Pharmacy Administration

Specialization in: Pharmaceutical Marketing;
Regulatory Affairs/Quality Assurance

Toxicology

Double Master's Degree Program

This leads to an M.S. in Pharmaceutical Sciences and an M.L.S. in Library Science. This dual master's program is offered in conjunction with the Division of Library and Information Sciences of the St. John's College Graduate Division of Liberal Arts and Science.

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 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 or in one of the physical, chemical or biological sciences. For graduate study in pharmaceutical sciences with a specialization in pharmacotherapeutics, a baccalaureate degree with a major in pharmacy, nursing, or physician's assistant 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.

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

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

* Residency for the Master of Science degree requires completing six credits per semester for 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.

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 or a minimum of 30 semester hours beyond the master's degree, 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. In some cases, students may be required to complete more than the minimum number of credits in their area of specialization or a minor field of study in order to make up any deficiencies which may exist.

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 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 College Doctoral Handbook for details concerning degree requirements.)

*M.S. students should consult the M.S. candidate handbook for 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 College doctoral handbook for details concerning academic status review and dismissal.

The Health Education Resource Center

Jaclyn Vialet, M.L.S., Director

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.

Department of Pharmacy Administration and Public Health (PAH)

Wenchen Wu, Ph.D., Chair

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 program 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 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 addresses 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 204 Health Care Systems 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. These factors include: demographic changes, demand for services, cost shifting, use of health technology, health care workforce distribution, financing of services by public and private payers, the rise of cost containment, Medicare and Medicaid, the evolution of the managed care market, and health care reform initiatives. *Lecture. 3 semester hours, 3 credits.*

PAS 211 Introduction to Pharmaceutical Marketing

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 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 213 Research Methods in Health Care Marketing

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 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 219 Health Care Outcomes Assessment

This 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. *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 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)

Frank A. Barile, Ph.D., Chair

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 I

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 I

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 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 239 Homogeneous Pharmaceutical Systems

Application of selected physicochemical principles to homogeneous pharmaceutical systems. *Credit: 3 semester hours.*

IPP 240 Heterogeneous Pharmaceutical Systems

Application of selected physicochemical properties to heterogeneous pharmaceutical systems. *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 software, 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 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 265 Introduction to Industrial Pharmacy I

This introductory course is designed for students who wish to pursue graduate education in Industrial Pharmacy. 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 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 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; 266 Principles of Drug Design I; II

Required course designed to present an overview of the basic principles involved in medicinal chemistry. *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.*

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. *Lecture. 3 semester hours, 3 credits. (No credit applied toward graduate degree.) Cf. PHS 4301 and 4303.*

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

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 base 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. The molecular and biochemical pharmacology of acute and chronic effects of pharmacologic agents are and new techniques and findings.

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 the 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.*

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 of two hours 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 of two hours 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 of two hours 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 of two hours 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

Corequisite PHS 261L. 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

The involvement of free radicals/reactive oxygen species (ROS) in the pathogenesis of a wide variety of human diseases has been increasingly recognized over the last two decades. *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 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

The source, chemical composition action, tests and antidotes of toxic substances. First semester consideration is given to materials of inorganic origin; second semester is devoted to substances of organic nature, both natural and synthetic in origin. *Lecture. 3 semester hours, 3 credits. No credits applied toward graduate degree. Cf. PHS 2401; 2402.*

TOX 201 Methods in Toxicologic Evaluation

Experimental toxicology and pathology deals with the 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

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

TOX 221 Hematologic Pathology

A study of the hematopoietic system. Topics covered include anemias, leukemias, coagulation defects with consideration of etiology, physiologic and cellular manifestations and therapeutic modalities. *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 satisfied. *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

Ebtesam Ahmed, *Associate Clinical Professor*, Pharm.D., St. John's University; M.S., Columbia University; Palliative care.

Emily M. Ambizas, *Associate Clinical Professor*, B.S. Phm., Pharm.D., St. John's University; MPH University of Massachusetts Amherst; Community Pharmacy Practice.

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

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

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

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

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

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

Joseph Brocavich, *Associate Clinical Professor*, B.S. Phm., Philadelphia College of Pharmacy and Science; Pharm.D., Duquesne University; curricular design; leadership development.

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

Jennifer Chiu, *Associate Professor Industry Professional*, B.S., Binghamton; M.B.A., St. Joseph's College; Applied patient care.

John Conry, *Clinical Professor*, B.S. Phm., Pharm.D., St. John's University; Ambulatory care, public health; HIV pharmacotherapy.

Angela Eaton, *Assistant Professor Industry Professional*, B.S. and M.Ed. Wayland Baptist University, Instructional Leadership. Applied patient care.

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; Pediatric therapeutics.

Irene Eng, *Instructor Industry Professional*, B.S. Alderson Broaddus College; Applied patient care.

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

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

Pamela Gregory-Fernandez, *Associate Professor Industry Professional*, B.S., St. John's University, M.S., Still University; Applied patient care.

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

Olga Hilas, *Associate Professor Industry Professional*, B.S. Phm., Pharm.D., St. John's University; MPH SUNY Downstate Internal medicine.

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

Mary Ann Howland, *Clinical Professor*, B.S., Wake Forest University; B.S. Phm., Rutgers University; Pharm.D., Philadelphia College of Pharmacy and Science; Clinical toxicology; poison control expertise, clinical toxicological management: emergency medicine pharmaceutical care.

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

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

Samantha Jellinek-Cohen, *Assistant Clinical Professor*, Pharm.D., Long Island University, Emerging medicine pharmaceutical care.

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

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

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

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

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

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

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

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

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; Internal medicine; drug information.

Maria Mantione, *Associate Clinical Professor*, B.S. Phm., Pharm.D., St. John's University; Community pharmacy practice; patient education.

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

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

Zaidalynet Morales, *Assistant Professor Industry Professional*, B.S., Lehman College; Applied patient care.

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

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

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

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

Michelle Pisano, *Assistant Professor Industry Professional*, Pharm.D., St. John's University, Ambulatory care.

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

Joshua Rickard, *Assistant Professor Industry Professional*. Pharm.D. South Carolina College of Pharmacy. Ambulatory care

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

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

Hira Shafeeq, *Assistant Professor Industry Professional*, Pharm.D., St. John's University; Critical care.

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

Candace J. Smith, *Associate Clinical Professor*, B.S., San Jose State University; B.S. Phm., Pharm.D., St. John's University; Pharmacokinetics; critical care.

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

Caitlin Stehling, *Assistant Professor Industry Professional*, Pharm.D. St. John's University, Pediatric, drug information.

Donna Sym, *Associate Professor Industry Professional*, B.S., Pharm.D., St. John's University; Infectious diseases.

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

Department of Pharmacy Administration and Public Health

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.

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

Monica Hwang, *Assistant 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, *Assistant 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.

Mieka Smart, *Assistant Professor Industry Professional*, B.A., M.H.S., Dr.PH. Johns Hopkins University.

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

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, *Associate Professor*, B.S., University of Richmond; Ph.D., Rutgers University; Role of BRCA1 in DNA damage repair and transcription.

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, *Assistant Professor*, B.S., M.S., Wuhan University, China; Ph.D. University of Kansas Medical Center.

Vikas V. Dukhande, *Assistant Professor*, B.S., Mumbai University Institute of Chemical Technology, India; Ph.D., Idaho State University.

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; The development of a simple biochemical system that allows us to evaluate the function assembly and disassembly of neuronal SNARE complex.

Vivek Gupta, *Assistant Professor*, B.S. Pharmaceutical Sciences–Jamia Hamdad University, New Delhi, India, Ph.D., Texas Tech University Health Sciences

Diane Hardej, *Associate Professor*, B.A., Queens College; M.S., Ph.D., St. John's University; The use of antioxidants in the treatment of neurotoxicity and stress proteins as biomarkers.

Vijaya L. Korlipara, *Professor*, B.S. Phm., Banaras Hindu University; Ph.D., University of Minnesota; Design and synthesis of receptor selective probes for opioid and neurokinin receptors.

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, *Assistant Professor*, B.A., California State University Northridge; Ph.D., University of Florida.

Aaron Muth, *Assistant Professor*, B.S. SUNY Binghamton; M.A. University of Virginia; Ph.D. University of Central Florida.

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.

Jeanette C. Perron, *Assistant Professor*, B.S.; Ph.D., University of Miami.

Vladimir Poltoratsky, *Assistant Professor*, M.S., St. Petersburg State University, Russia; Ph.D., St. Petersburg Institute of Cytology, Russia.

Sandra E. Reznik, *Professor*, A.B. Harvard University; M.D., Ph.D., Mount Sinai School of Medicine; Developmental and placental pathology, specifically the role of several placental peptidases and proteinases in perinatal pathology.

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.

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.

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. Wurpel, *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.

Byron C. Yoburn, *Professor*, B.A., Boston University; M.A., Hollins College; Ph.D., Northeastern University; Molecular aspects of opioid receptor regulation, drug tolerance and dependence.

Sabesan Yoganathan, *Assistant Professor*, B.Sc. Chemistry; McMaster University, Canada; Ph.D. Organic Chemistry and Chemical Biology; University of Alberta, Canada.

S. William Zito, *Professor*, B.S. Phm., St. John's University; Ph.D., University of Connecticut; Biosynthesis of pyrethrins; tissue culture as a method to study drug metabolism.

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